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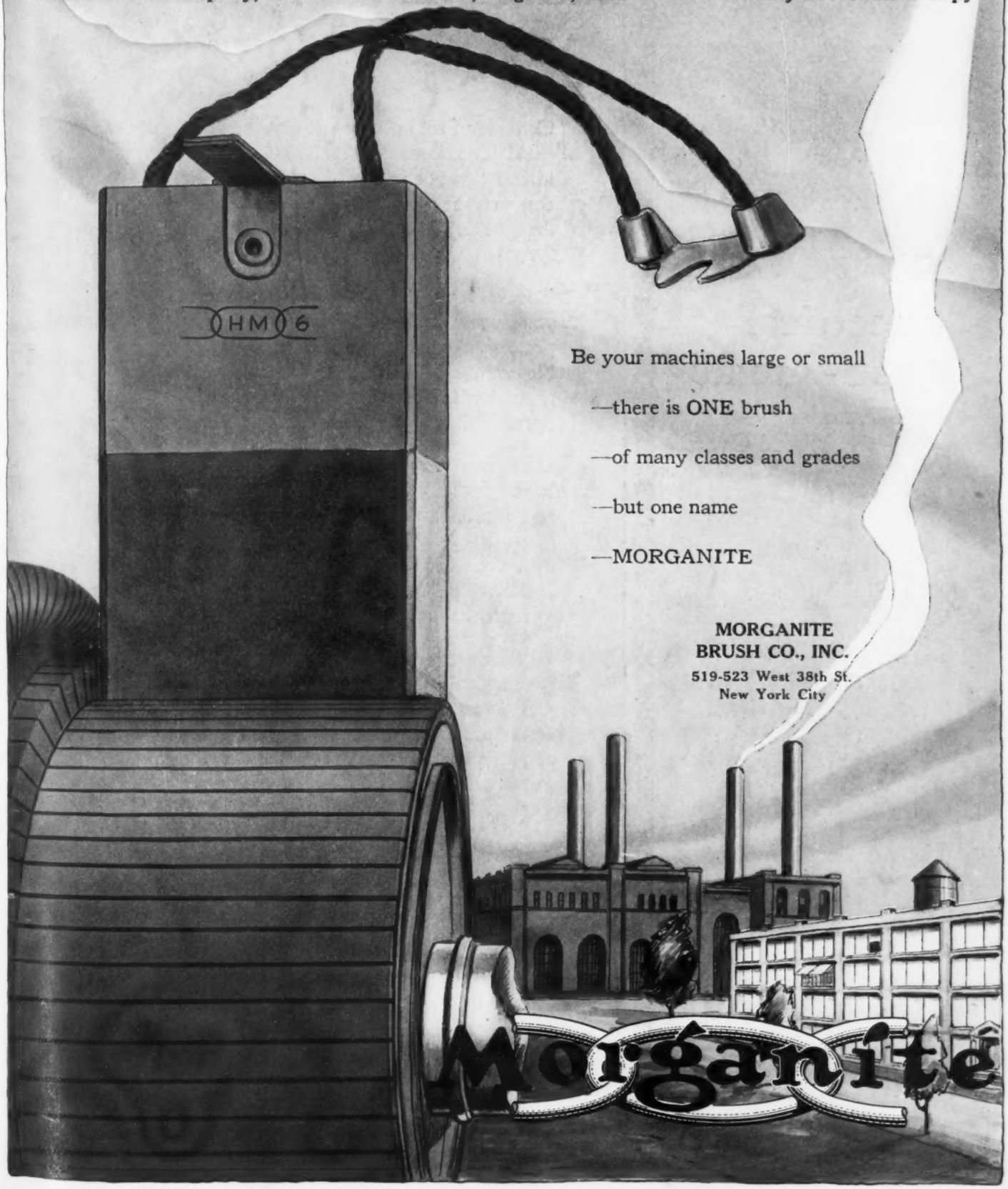

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The Spirit of Interconnection

INTERCONNECTION is a long word. It has been a big word in recent electrical history. Speak it and there come to mind pictures of great central-station systems linked together by physical connection so that each may draw upon the other for electrical energy.

We have published maps of whole states and groups of states whose power resources are shared, and printed many stories of how this new method of give and take between utilities has helped out in emergencies.

But interconnection is more than this if you have sensed the fundamental meaning of the word. It is just another application of the *e pluribus unum* idea. The spirit of interconnection is a principle as practical, as profitable and as logical applied between the executive offices of central stations as it has been proved where it has tied two generating stations together.

NO BETTER example of the advantages of interconnection exists than in the railroads. You buy a ticket in New York for San Francisco. You board your car, make yourself comfortable, and the train starts. Day and night it hurries on along the rails. With but one change you arrive at the appointed hour. You say, "The railroad brought me here." You are not conscious of the fact that it has taken maybe seven, maybe ten railroad companies to carry you across the continent. The only evidence that you have seen has been the appearance of a new conductor or trainman from time to time.

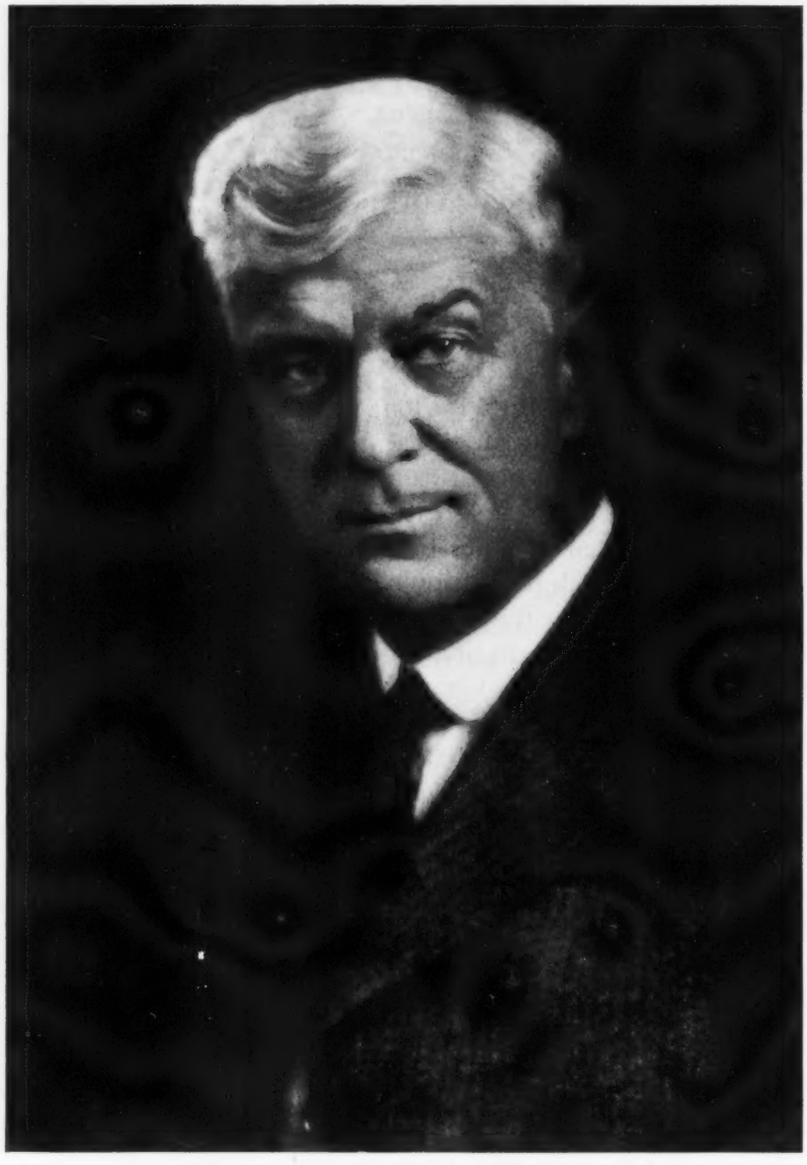
Interconnection has made this possible. But it is more than a simple interconnection of steel rails, important as that may be to your long journey. Interconnection of purpose, interconnection of personnel, interconnection of train schedules, interconnection of many other elements of personal and impersonal service, interconnection of ideals—all these have been organized into what we lightly call our railroad systems. The spirit of interconnection pervades and dominates it all, and this is what has made the safety, speed and comfort of our railroads possible.

THE electrical industry has taken but the first step in applying this spirit of interconnection for the benefit of the American public that the railroad systems have united to serve so well. Some of the more progressive power companies have already joined together their transmission lines. Some day this will be universal practice. But what of policies and the character of the service?

The principle of interconnection will guide us to great opportunity if we will follow it. For when people can use their motors and flatirons in any town, and find the rules and regulations of different companies alike, and feel the friendly educational influence of all central stations working together, then they will understand us better. And out of understanding will come pride, dependence—and traffic, as with the railroads. And the industry will profit much.

Elmer E. Woodward

Pioneer inventor, designing engineer and manufacturer of waterwheel governors.



TO HAVE achieved success in a unique field, one in which not a few have failed, is the distinction attained by E. E. Woodward, president and general manager of the Woodward Governor Company of Rockford, Ill. The waterwheel governor is an indispensable accessory to the modern hydro-electric plant. During the development and progress of turbine waterwheels and their installation there has also been remarkable improvement in waterwheel governors. For nearly four decades manufacturers of waterwheels and concerns using them have been greatly indebted to Mr. Woodward for his untiring efforts and close application to this business, in which he has attained so enviable a position.

Mr. Woodward's success has been achieved in his native city, for he was born in Rockford in 1862. His taste for mechanics took him, when he was twenty years old, into the plant of his father, the late A. W. Woodward, a manufacturer who had built a few of the simple governors of that day applicable to waterwheels driving mills through mechanical transmission devices. At that time the present hydro-electric unit, serving high-voltage transmission lines of what would then have seemed incredible length, had not been conceived.

One of Mr. Woodward's early inventions was the compensating-type mechanical governor, which was greatly needed and met with much favor, as many of the small and medium-size plants of that day required far better regulation than could possibly be obtained with a simple mechanical type. It is of interest to note that the compersating type is the only successful quick-acting mechanical governor in the world today. Recognizing, however, that this type has its limitations, Mr. Woodward a number of years ago developed and perfected the Woodward oil-pressure governor. This also was very favorably received.

The trend of the times continuously demands better and more accurate regulation as well as many other refinements in design, and Mr. Woodward's genius has been quick to respond to these needs as well as to anticipate what is now essential in the most modern hydro-electric plants. He has been concerned with thousands of waterwheel installations under all kinds of conditions. Latest of Mr. Woodward's achievements is the invention, development and perfection of the apparatus required on governors for automatic non-attended hydro-electric plants. It is thought that this improvement will permit many water powers to be developed that otherwise would not pay on account of the operating expense. It is also expected that this automatic apparatus will be sought by many plants because of its convenience and simplicity of operation.

As a youth Mr. Woodward was of a studious turn of mind, and this trait has been pre-eminent in his career. Nothing apparently gives him more pleasure than to set himself to a difficult engineering problem, especially if it pertains to the regulation of waterwheels, and invariably he will solve it. Not only is he a persistent student in engineering and a master of the mechanical end of his business, but he is also a man of good executive ability. The growth of the business of which he is the head is indicative of his genius and his industry in the promotion of the hydro-electric industry through the development of hydraulic equipment.

Editorial Comment

Electrical World, August 5, 1922

Volume 80 Number 6

Coal and Rail Strikes Will Soon End

LET no man deceive himself regarding the coal and railroad strikes. Both will soon be over. However, the vexed question of coal supply will remain, for it is not possible to make up over night a shortage of coal caused by a strike of three months' duration. Coal will have to be rationed, and the federal government has shown commendable wisdom in intrusting the problem to state authorities and state utility commissions. The latter are more familiar with local conditions, and it is probable that the states have more power to cope with the situation than the federal authorities. The railroad strike must be settled first, however, since priorities are of little use if the railroads are not in a position to move the coal.

Out of all the disturbances two facts thrust themselves forward—one the excellent service maintained by the electric public utilities, and the other the recognition accorded by the Interstate Commerce Commission to public utilities, based, no doubt, upon a realization of the value of continuity of service in public utility work. The public utilities may therefore rest content, knowing that if there is any coal to be had at all, those in authority will see that the utilities are supplied. There is no immediate cause for alarm. The general public has refused to be stampeded by either the coal or the railroad strike, and lacking public interest and public support both strikes must soon terminate.

Of What Use Is Electricity on the Farm?

THE careless assertion is frequently made by central-station men that the farmer has little use for electricity on the farm. Yet in a recent commission hearing on the subject of rural service one of the witnesses laid emphasis on the large part that a proper water supply plays in the fattening of stock for the market. When it is available at the right time and, in the winter, at the right temperature, it is possible, he held, materially to shorten the time of preparing stock for market. Ground feed also plays an important part in some phases of this sort of farm work. In both situations electric power may give control of water and feed conditions to an extent that is not possible in any other way. Again, another opportunity lies in the use of irrigation for some forms of farm produce. Berries and many vegetables are frequently short crops because of lack of rain at the crucial period of their development. A general-utility motor of one to three horsepower or less can often be utilized for such purposes with improvement to the present poor load factor of farm-line demands.

There are no data available now to show the exact part that electric service can play in increasing farm efficiency. There are many data available on the effect of such things as proper feed and water for stock. The problem that needs study is how electricity can be used to produce the conditions that our agricultural schools have determined to be necessary for efficiency in the agricultural industry.

Twenty years in the development of industrial plant equipment has increased the inherent advantage of electric power through the development of machines designed for use with the electric motor. The same process will be gone through in the farm equipment field, and it is becoming evident that this is recognized by some of the leading men in that field. The next few years may bring forth surprising developments, and it will be well for central-station operators to give attention to these phases of the farmer's problem. They will be one of the agencies called on to help in this development.

Shaping Policy on Wired Wireless

THE rapid development of radio has brought with it new problems to electric light and power companies, so much so that the National Electric Light Association has a sub-committee of its public policy committee at work on the entire question of radio, particular attention being directed to "wired wireless." There is a very general feeling that broadcasting in all cities and communities of any size will be brought about by this new development of "wired wireless" because of the elimination of antennas and batteries. Naturally this will raise important legal and public-policy questions, and before adopting any definite policy it might be well for electric light and power companies to await the report of the sub-committee of the N. E. L. A. on the subject. The committee is made up of men of high caliber who may be counted on to go exhaustively into the matter, and in view of the wide interest manifested an early report may be looked for.

Are Power Reports Going Out of Fashion?

UNDER the pressure of installing electric service for power or industrial heating applications, central-station engineers often overlook the preservation of the comprehensive analytical data upon which such contracts were based. The result is a painful shortage of complete information in many localities when attempts are made to compare notes and study the economics of industrial central-station service.

It would be foolish to assert that thoroughgoing studies of power situations are no longer made in the vast majority of central-station sales departments. Without such analyses new business could not be obtained at anything like the present rate. But the point is what becomes of the data after the contract is

signed? In altogether too many cases they are thrown into a folder and filed in a rough form which makes them of dubious value for future reference. Over and over again the "prospect" is furnished with little more than an extended memorandum of the salient points on which his decision as to taking service is to be made. The bound report of earlier days is apparently less and less necessary to secure the business.

Anything which facilitates getting new business at lower cost is welcome to the modern central-station manager, provided that nothing is omitted the loss of which is injurious to future development. Whether a bound report similar to that which a first-class consulting engineer would render is needed in a particular case depends, of course, on circumstances. Some companies doubtless overdid the report idea a few years ago and actually aroused suspicion by the *édition de luxe* appearance of their propositions. Now, however, the pendulum has swung too far the other way, and as a result the files of many power sales departments are fragmentary in the extreme. We do not plead for a return to the gilt-edged, red-bound limited editions of power reports (embellished with the prospective customer's name in gold on the outside) which were quite the rage in certain utility circles in pre-war days, but too much emphasis cannot be laid upon the importance of establishing and maintaining a complete record of essential information, tests, layouts proposed, cost computations and economic conclusions in such form that for years to come it will answer the questions of the engineer charged with the responsibility of providing service at the minimum cost to the customer and to the company. Utilities which gladly and intelligently meet the moderate cost of compiling and maintaining such data are thereby laying foundations for future prosperity which are well-nigh invaluable.

Importance of Research in Cable Manufacture

ACTIVITY in research on the problems of cable manufacture continues apace, as indicated by the papers presented in a session devoted entirely to this subject at the recent convention of the American Institute of Electrical Engineers. A change in viewpoint and method of attack is suggested by one or two of the papers. In the past, work in this field has been characterized by a study of the materials entering into cable construction and their improvement on one hand and by effort to determine a satisfactory method of rating cables as based on their losses, heat conductivity and the outside temperature. These are the usual and natural methods of most engineering experiment; that is, to determine and improve the constants of the available materials and to design the equipment by a proper relation of these constants to the conditions of operation. For work of the latter character in the field of cables the paper by Atkinson of a year or so ago and now that by Roper on the selection of cables for specific duty are conspicuous examples.

The recent convention papers, however, are generally notable for a new departure in that they devote more attention to the scientific study of the underlying theory of cable operation. Insulation in general is one of the most serious problems of electrical engineering and the factor of all equipment of which we probably know least. Particularly in the case of cables there is much evidence that the usual simple ideas of electric stress, as computed from the dimensions, in its relation to the dielectric strength of the insulation, are not sufficient to account for all the conditions surrounding the failures of cables. Manufacturers therefore are looking deeper into the theory of insulation. Thus the Del Mar-Hanson paper introduces a study of the motion of ions in liquid dielectrics as affecting their electric strength, and the Middleton-Dawes-Davis paper, investigating the existing gradients in cables, finds, as long suspected, that the inner layers of insulation may be stressed to abnormal values without evidence of failure.

The realization that further improvement in American cables must come through a better understanding of the ultimate nature of the processes involved in insulation, and that this can result only from scientific investigation of the highest type, was indicated in the discussion. Moreover, it was suggested that further knowledge will probably lead to a radical readjustment of our present ideas as to the simple nature of electric displacement, electric stress distribution in concentric fields and their relation to dielectric strength as usually understood.

More Light on the Specific Injury from Electric Shock

THE whole matter of death from electric shock has become much complicated, not to say muddled, by the diverse effects produced by shocks of various sorts and intensities. Judging from experiments running many years back, there is a material difference between the phenomena produced by shock from direct current and that produced by alternating current as such, although the two sets of phenomena merge when the current is of high intensity. When this condition exists the conspicuous observed phenomena are those due to heating and destructive action on the cells of the blood and the circulatory system. Hence, as G. M. Ogle notes in his enlightening article this week on the subject of effects of electric shock, there has been a good deal of misunderstanding regarding the possibility of remedial measures.

Death may result from alternating-current shock insufficient in itself to produce the effects mentioned above by interrupting the ordinary working of heart and lungs. In these cases, which are not uncommon, the victim virtually dies of suffocation unless he is quickly removed from the circuit and subjected to the ordinary means of revival after suffocation. From shocks acting in this manner one passes by degrees to shocks involving an expenditure of electrical energy sufficient to produce the effects frequently noted in electrocutions. When these conditions, which Mr. Ogle very well describes, have supervened no amount of artificial respiration or other remedial efforts appropriate for suffocation can possibly produce any results. However, it should be remembered that the energy spent upon the victim in the case of electrocution is many times that which may be sufficient to produce a fatal shock.

We do not agree with Mr. Ogle that a shock fatal to a normally healthy person at 110 volts alternating current or thereabouts is entirely impossible. There have been divers reports of death from this voltage in which there was no sound reason for suspecting a connection with high-voltage conductors. However, a fatal accident at 110 volts is extremely unlikely, for the reason

that it would require an extraordinarily good contact across the victim's body to pass a current large enough to produce fatal results—a contact out of the question except under unusual circumstances. Even in the case of direct current, which produces small nervous shock and is believed to cause death by its permanently destructive action on the blood, tissue and circulatory system, there is at least one recorded death from 220 volts, the victim of which had been in normal health according to the autopsy. He had been standing in water and made good contact with a bare conductor while the other side of the circuit was accidentally and thoroughly grounded.

With either alternating current or direct current, whether a person is killed or only shocked is merely a question of how good a contact is established and what path the current takes through the body. Prevention of fatal accidents should be greatly aided by broadcast dissemination of the information presented in Mr. Ogle's article.

Now Is the Time to Rehabilitate Street Lighting

CONDITIONS with respect to street lighting have changed very materially in the last decade. Perhaps the one thing that more than anything else has affected the situation is the enormous increase in motor traffic which has converted comparatively unimportant highways into through streets of large significance with respect to their requirements. Motor headlighting is not enough to remove the combined difficulties of dense traffic and fast driving at night. The blinding glare and intense shadows which are still all too common increase the troubles of the driver, and the street lamp has become a matter of grave necessity in making highways safe under modern conditions.

The old spotted lighting given by wide-spaced arc lamps, generally hung too low, has become a nuisance. The small incandescent lamps at the curbstone serve to cast malevolent shadows to make driving still more difficult, and there is and has been a great incentive toward a change for the better, which now that war-time days are past becomes at least feasible.

In the first place, the large incandescent lamps, even up to 1,000 cp., have demonstrated their usefulness, when placed fairly high, in lighting the first-class thoroughfare quite uniformly and steadily. So, too, with the arc lamp; but the latter lends itself somewhat less readily to redistribution of its light by means of refractors. For streets requiring less intense lighting, the medium-power "incandescents," if properly spaced and placed with reference to their use, enable almost any requisite intensity to be furnished in well-distributed illumination. The account which we gave last week of the lighting system of East Cleveland, Ohio, portrays an excellent example of the present drift of enlightened practice.

Practical requirements certainly frown upon straggling arcs fed from overhead wires and the little incandescent lamps which used to replace the flickering gas lamps of a generation ago. In city lighting at least the overhead wire must go. It is particularly obnoxious when lighting units are distributed, as for the best illuminating results they should be, on both sides of the street. Again, if underground distribution is utilized, it is undesirable and expensive to space the lights as closely as in the old gas-lighting days, and considerably bigger sources separated somewhat widely and made effective by suitable redistribution of their light meet technical requirements and financial ones with equal success. This solution of the difficulty, too, makes it desirable to place the lamps higher than has been usual, with facilities, as in the bracket lantern used at East Cleveland, for getting the light far enough out over the street to avoid trouble with trees.

With all these modifications of practice in mind, the question will inevitably arise whether street lighting thus skillfully planned for efficient illumination cannot in many instances be carried out to advantage on multiple-series distribution instead of by the high-tension circuits more generally used. It should be remembered that in foreign practice series distribution is a very unusual method of street lighting. It involves undesirable plant characteristics and greatly increased difficulty of insulation, easily avoidable in a district of fairly dense service by adopting the multiple arrangement. There are many ways in which current American practice is behind the precedents long familiar across the water, and it is well to give attention to these differences in practice, as probably not due altogether to the recklessness and incapacity of foreign innovators.

Let us take heed of the best examples of American practice and not be afraid to unite them with the experience of others. Now is the time to undertake the rehabilitation of street-lighting systems if they are to be in readiness for the fall and winter months with their longer dark periods.

Objectors to New Pole Specification Should Give a Reason for Opposition

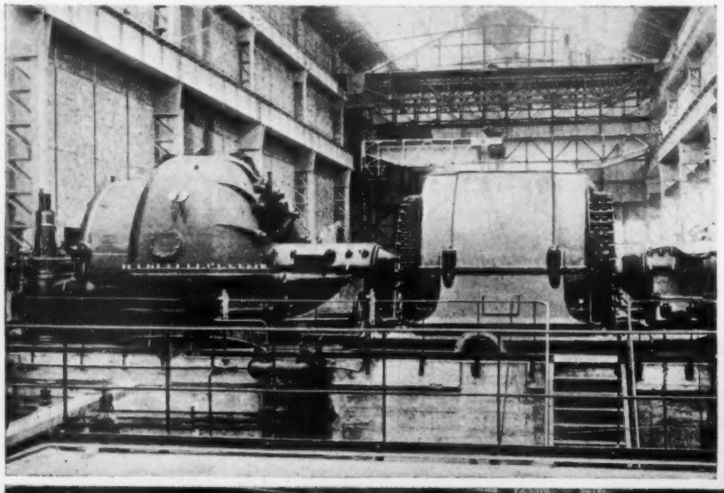
IT HAS been evident for some years that the old pole specifications no longer fit the product that is available. No matter how desirable the older requirements may have been from a theoretical engineering standpoint, it is time that they were superseded if the requirements cannot be met.

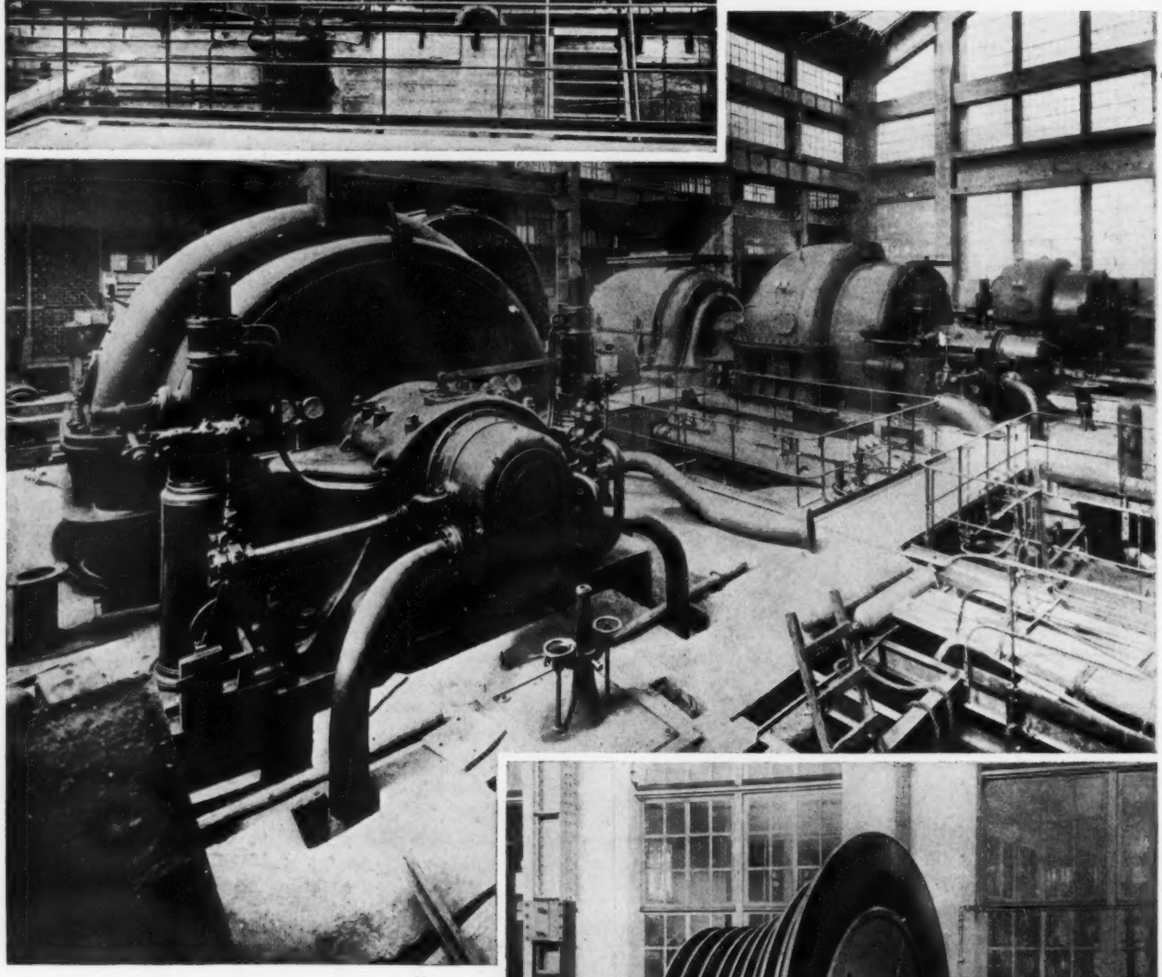
A new specification and classification of wooden poles, which will better represent the materials grown in the United States, was presented and adopted as a recommended tentative uniform practice for the coming year by members of the National Electric Light Association at the recent meeting in Atlantic City. This specification was prepared by a sub-committee working with various pole producing and handling firms, and therefore it is reasonable to suppose that the interests of all concerned were considered.

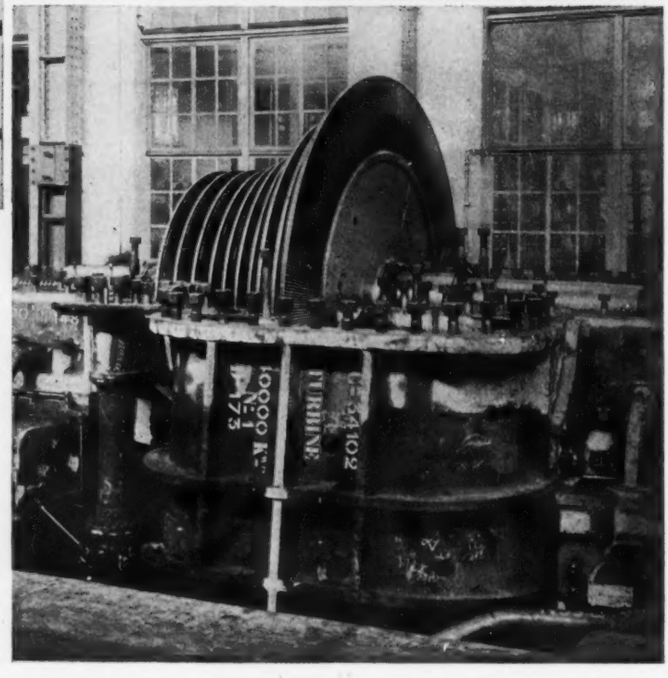
The argument for the new specification is that it will permit better use of available timber and thereby help in the conservation of the supply. The change in the classification will also permit the ready shifting of a pole from one class to another by the simple expedient of cutting off the top, thus making the pole a shorter one of the next higher class. What the practical effect of the change will be remains to be seen.

The specification is not yet a definite standard; it is still on trial and is to be kept under observation until the effect of practical use is observed. Users should make a record of the advantages or disadvantages of its application so that they can be brought before the N. E. L. A. committee for later consideration. This should be done before long-continued use has made the specification hard to change. The next year or two is the time to present objections, if any are found.

The 40,000-Kw. Turbines of the Parisian Superpower Plant







At top, a turbo-generator unit nearly ready for operation. The end windings of the armature are exposed, as the end bells had not been placed when the photograph was taken. There are five of these units now installed or in process of installation; ultimately there will be eight.

In center, a recent view in the turbine room, taken to show the steam end of the unit and the general layout of this part of the station. While of several different makes, the units are all substantially alike.

At bottom, the turbine rotor, which contains but ten wheels to provide for this number of pressure stages. The speed of this rotor is 1,500 r.p.m. The turbine is of the Zoelly type.

The New Superpower Plant Near Paris Approaching Completion

By Use of Highest Boiler Pressure Thought Economical, Recovery of Wastes and Adoption of Large Units, the Designers of This Station, Ultimately to Be Rated at 320,000 Kw., Have Made a Notable Achievement

FOUR miles east of Paris, on the bank of the Seine River, the great Gennevilliers power plant rapidly assumes its finished form. This plant promises to be one of the most economical in the world, the designs having been prepared with these four fundamental considerations in mind: (1) that the highest practicable steam pressure and temperature should be employed in order to obtain high thermodynamic efficiency; (2) that boilers in the largest practicable sizes should be used, with all auxiliaries which would tend to minimize the outflow of heat through the stack; (3) that the largest practicable size of steam turbine should be used, with provision for heating the feed water from the low-pressure stages; (4) that every feasible means of gathering up stray heat should be adopted.

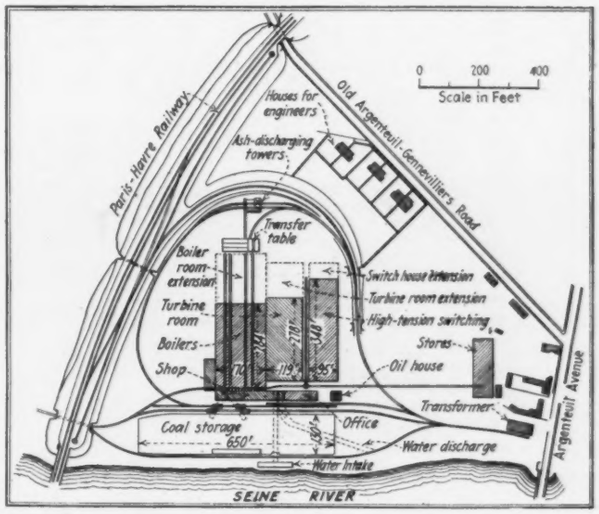
While, of course, the fundamental principles employed here are those which control the design of every power plant, they are applied in some unusual ways in this case. Attention will be directed particularly to the features in which Gennevilliers differs from many other plants.

In this examination it must be borne in mind that the high cost of fuel in the region of the plant was a ruling consideration in the design, pointing to the desirability of concentrating the local power supply to permit the use of large units. This necessitated the amalgamation of practically all of the power-producing companies in the vicinity of Paris. The first step was the formation of the Union Française d'Electricité in 1919, followed by the absorption of other utility companies to form the present Union d'Electricité.

The initial capacity of the Gennevilliers plant is 200,000 kw., produced by five similar turbine units, supplied with steam by fifteen boilers, five being double-end boilers each of twice the capacity of the others. The turbines operate at a throttle pressure of 313 lb. gage and at about 280 deg. F. superheat. Some general information regarding the plant is given in Table I.

TABLE I—GENERAL FACTS REGARDING THE GENNEVILLIER PLANT

	Double-End Stirling	Single-End B. & W.
Number of boilers	5	10
Heating surface per boiler, sq.ft.	22,600	14,300
Superheater surface, sq.ft.	10,764	8,190
Economizer surface, sq.ft.	12,915	8,617
Ratio of volume of water to volume of steam	4.05	2.21
Volume of water per square foot of heating surface, cu.ft.	0.127	0.09
Steam guarantees:		
Normal steaming rate, lb. per hour	132,000	88,000
Pounds per hour per square foot of heating surface, normal rate	5.85	6.15
Pounds per hour per square foot of heating surface, maximum rate	7.79	8.12
Total grate surface per boiler, sq.ft.	660	394
Number of generating units		5
Maximum continuous load, kw.		40,000
Speed, r.p.m.		1,500
Frequency, cycles		50
Terminal voltage		6,000
Guaranteed steam consumption of turbine without bleeding, lb. per hour:		
At 40,000 kw.		9.62
At 30,000 kw.		9.46
At 20,000 kw.		9.9
At 10,000 kw.		11.0



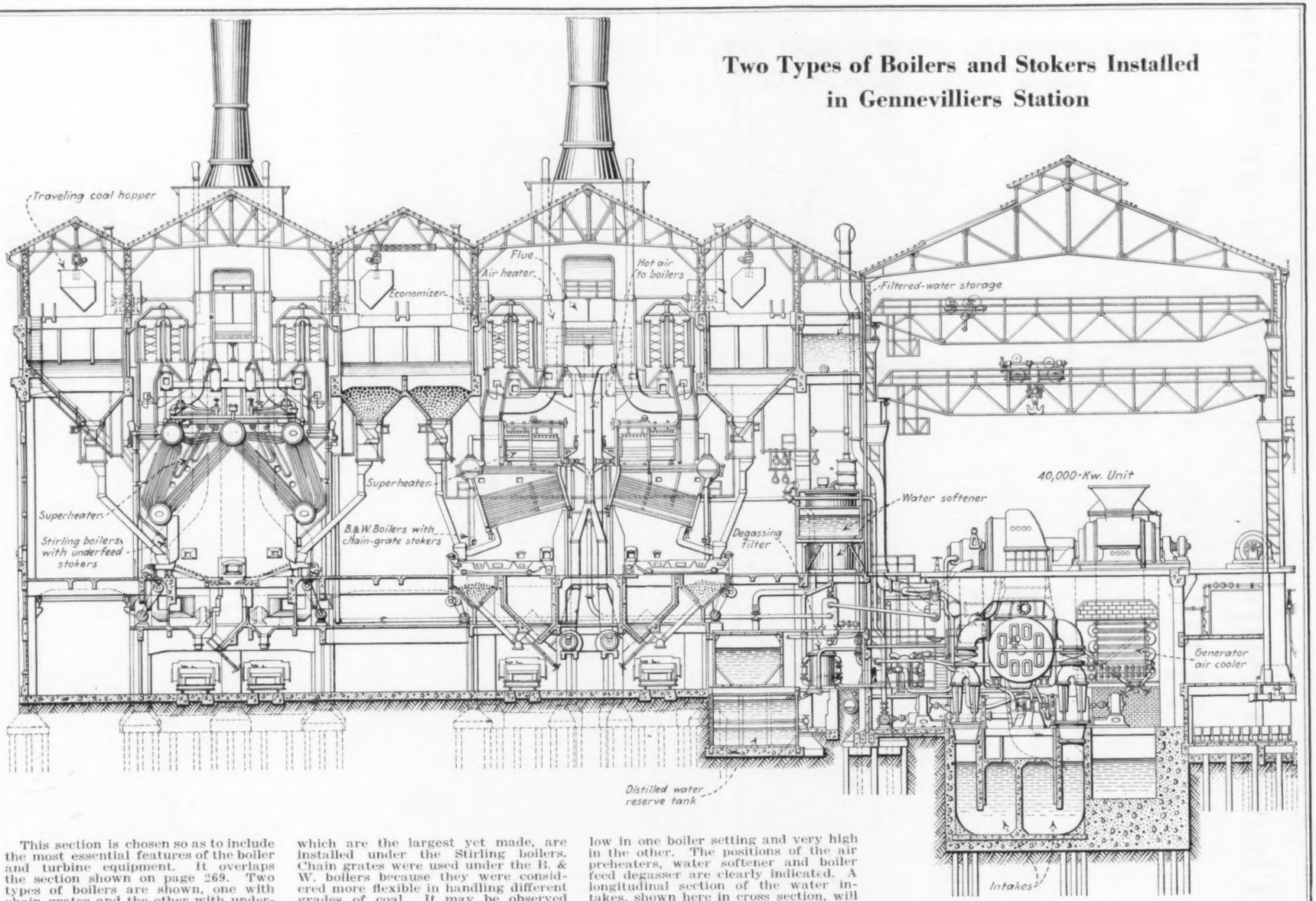
GENERAL PLAN OF GENNEVILLIERS POWER PLANT LAYOUT

As shown in the accompanying plan, the power house lies in an angle between the Seine River and the Paris-Havre Railway. It is in the usual three sections—the boiler house, the turbine house and the high-tension switch house—the dimensions of all of which are given in the plan. Between the buildings and the river is a coal-storage yard, with capacity for 60,000 tons. The intake and discharge tunnels for condensing water pass under this yard.

The first feature of interest in the boiler house is the use of two types of boilers, double-end Stirling and single-end marine-type Babcock & Wilcox. Two types were used rather than one because the plant had to be built to handle a considerable variety of fuel and at the same time it was desired to have a high degree of flexibility in operation. Part of the plant was therefore equipped with Stirling boilers fitted with Riley underfeed stokers, and the remainder with B. & W. boilers and chain grates. Two B. & W. units set back to back have approximately the same over-all length as one Stirling unit. In extending the boiler plant, therefore, either type may be installed without changing the structural features. The use of the large boiler units results in a floor space of only 0.24 sq. ft. per kilowatt installed. The arrangement of three rows of boilers, grouped in

A summary of the design constants for the plant is given in Table II, page 270.

Two Types of Boilers and Stokers Installed in Gennevilliers Station



This section is chosen so as to include the most essential features of the boiler and turbine equipment. It overlaps the section shown on page 269. Two types of boilers are shown, one with chain grates and the other with underfeed stokers. The underfeed stokers, which are the largest yet made, are installed under the Stirling boilers. Chain grates were used under the B. & W. boilers because they were considered more flexible in handling different grades of coal. It may be observed that the combustion chamber is very low in one boiler setting and very high in the other. The positions of the air preheaters, water softener and boiler feed degasser are clearly indicated. A longitudinal section of the water intakes, shown here in cross section, will be found on page 270.

two blocks, with three firing aisles, also conduces to floor-space economy.

The flue gases, after leaving the boilers, pass first through steel-tube economizers, of the form of an inverted U. Under normal load these lower the flue-gas temperature from about 620 deg. F. to about 430 deg. They then pass through an air preheater, losing about 130 deg. more. The air for the furnaces enters the preheater at about 85 deg. and leaves at 195 deg. From the heater the air goes, by way of a hot-air box over the boiler and suction ducts, to the forced-draft fans.

The preheater is composed of channel-iron frames and No. 7 gage steel plates, forming passages through which the air and the flue gases travel in alternate layers only 1⅜ in. thick. The air is taken from the top of the boiler room, where it has become heated to a certain extent, and travels downward through the heater, while the hot gases travel upward.

The heater plates are in standard commercial sizes and may be replaced without drilling, punching or machining of any kind, the whole structure being clamped together by means of long tension bolts.

The stacks in the Gennevilliers boiler plant are of the convergent-divergent type, which was selected on account of economy in construction. They operate on the ejector principle, a jet of high-velocity gas being driven upward from a point just below the waist of the stack.

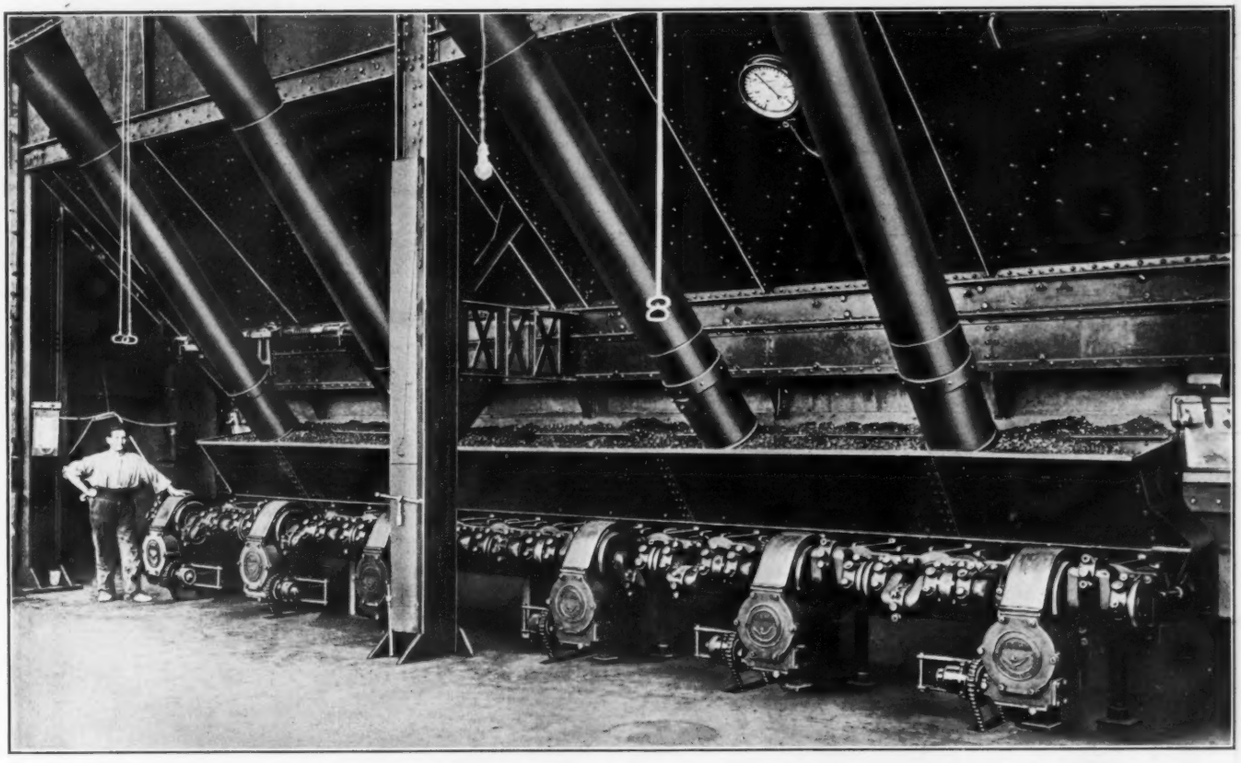
There will be six of these stacks for the present, three each for the Stirling and B. & W. boiler sections. For each stack there will be two induced-draft fans, and for the boilers forced-draft fans, four for each Stirling and two for each B. & W. All fans have adjustable-speed motors.

The feed-water heating has received special attention in this plant as a means of saving fuel. The condensate is used in part for cooling the generator ventilating air, circulating in a closed air circuit, and also for cooling the generator bearings; the economizers transfer heat to it from the flue gases; steam bled from the turbines adds its quota of heat, and the exhaust from the steam-driven boiler-feed pumps finishes the heating process in the condensate tanks.

The make-up water is softened by the Kestner method, involving the Cochrane hot-soda process. After the water has been treated, it goes to one of two distilling boilers reserved especially for make-up water, the other boilers receiving condensate. One distilling boiler is a reserve. To prevent concentration of salts in the distilling boilers a certain amount of water is drawn continuously from their mud drums, returned to the purifier and mixed with the make-up water.

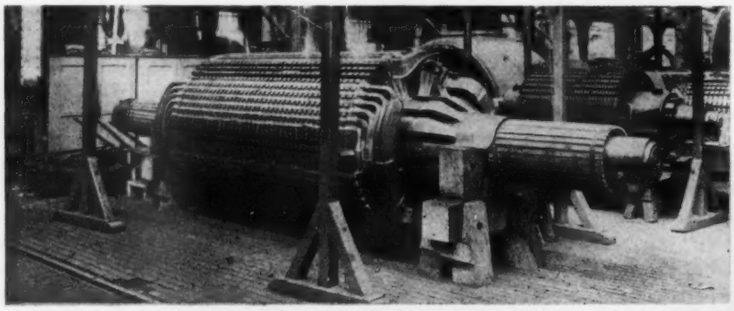
Before going to the boiler-feed pumps, both the boiler make-up and the condensate from the turbine condensers pass through special de-gassing filters, filled with finely divided iron. This metal removes the last traces of oxygen.

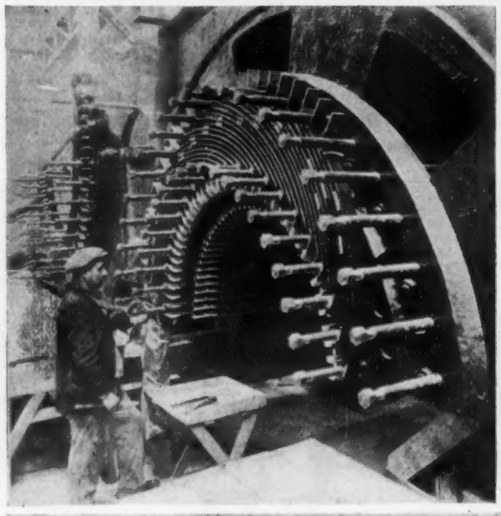
As was suggested earlier, the Gennevilliers plant is ideally located with respect to coal supply. The storage yard, which lies along the water front, is depressed 10 ft., permitting flooding of the lower portion of the pile. Two traveling cranes bridge the yard, and provision is made for unloading either barges or railroad cars. The coal is either stored in the yard or dumped into 20-ton cars, which run on a standard-gage track. For loading these cars a belt conveyor, running through the center of each crane, is provided. The cars transport the coal to pits opposite the boiler plant, from the bottom of which it is lifted by duplicate bucket conveyors to the crusher, whence it is raised to the top of the boiler house.

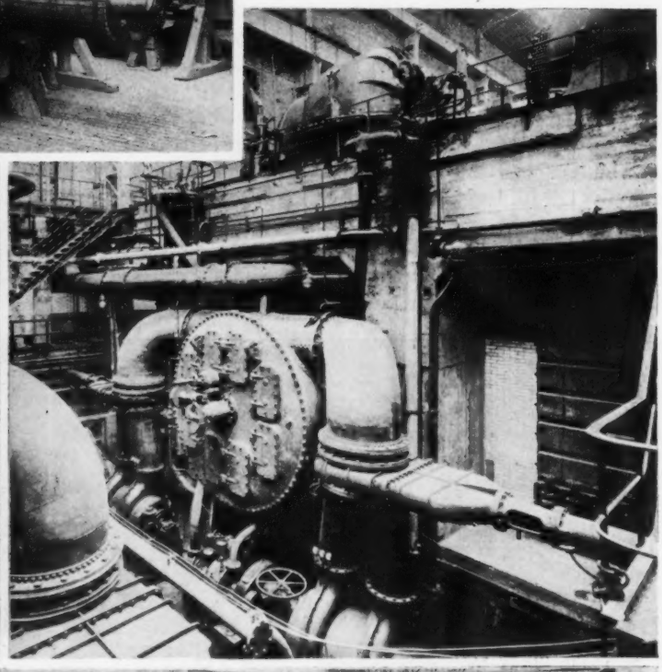


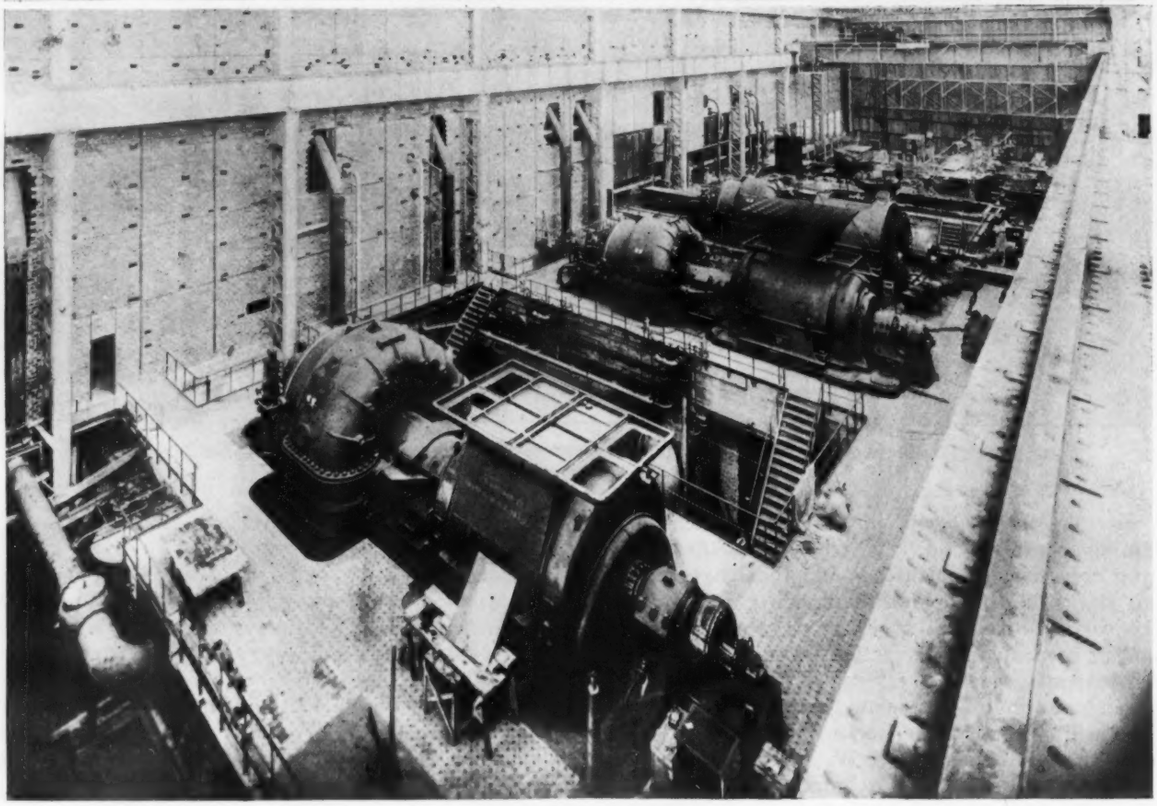
THIS STOKER AND ITS MATE CONTAIN THIRTY-SIX RETORTS AND PROVIDE A GRATE AREA OF 660 SQ.FT. UNDER A DOUBLE-END STIRLING-TYPE BOILER

Some Details of the Gennevilliers Superpower Plant









At top, the generator rotor in process of winding. In center, left, unfinished stator winding, showing details of end connections. In center, right, end of the steam condenser which has less than one square foot of condensing surface per kilowatt of turbine capacity. At bottom, turbine units in several stages of completion.

An elaborate monorail overhead system is used to distribute the coal to the bunkers, employing 6-ton motor-driven traveling hoppers. The rail is so laid out with switches that any bunker can be reached by way of four routes. The rail is sectionalized and provided with an interlocking block signal system to prevent collisions.

Each car carries two 500-volt motors and draws its current from a trolley wire.

TURBINES HAVE ONLY TEN PRESSURE STAGES

The five turbines in the plant are of the Zoelly impulse type, single-cylinder and single-flow. There are but ten pressures stages, each consisting of one velocity stage. The speed of the machines is 1,500 r.p.m. They are controlled by two automatic admission valves and two by-pass valves, the latter admitting high pressure into the second stage above 30,000 kw. These valves are oil-operated and controlled by the governor, and their action is throttling.

Provision is made for bleeding steam from the seventh and eighth stages for feed-water heating, and important element in maintaining heat balance in the plant.

Although three different builders are represented in the five turbines, they are practically identical.

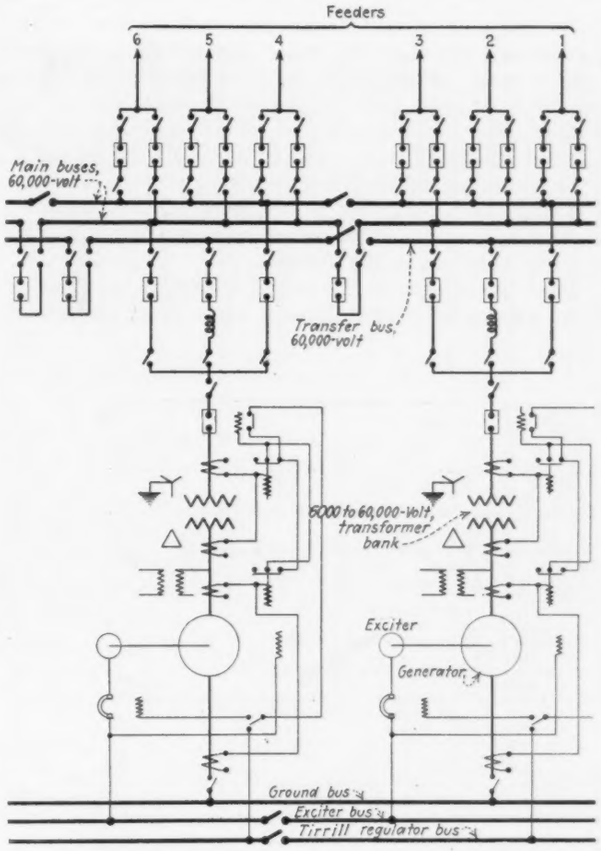
The surface condensers into which the turbines exhaust have but 37,650 sq.ft. of condensing surface, or 0.94 sq.ft. per kilowatt. The tubes are only 0.866 in. outside diameter. Each condenser is equipped with two motor-driven condensate pumps (one a spare), three air ejectors (one a spare), a motor-driven circulating pump (for normal operation) and a duplex motor and turbine-driven circulating pump (for emergency use).

The steam piping in the plant is designed to utilize the high-velocity possibilities of the high-pressure steam to the limit. The velocity in the 10-in. turbine mains at full load approaches 12,000 ft. per minute.

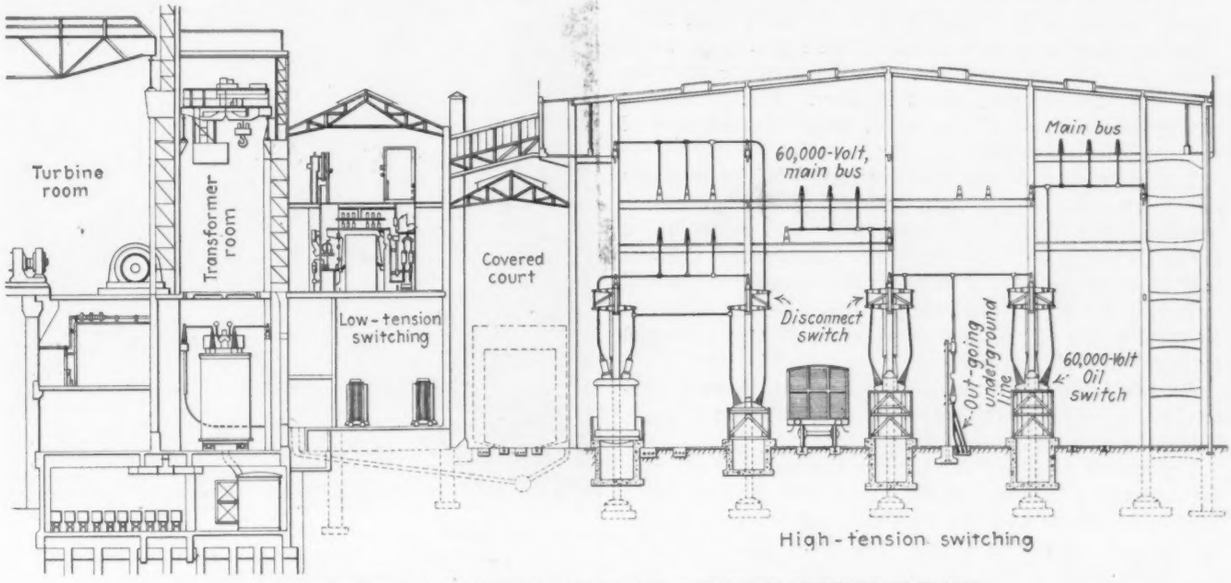
CLOSED-CIRCUIT COOLING SYSTEM FOR GENERATORS

Electrically the three-phase, 50-cycle, 40,000-kw. generators follow standard designs. Although the product of two manufacturers, they, like the turbines, are similar in detail and their rotors are interchangeable.

The generators are cooled by means of a closed air circuit, using the same air repeatedly, thus avoiding the necessity of washing a continuous supply of air and largely eliminating the fire risk. This air is cooled in surface coolers, arranged somewhat like a condenser, in the foundation of the generator. The condensate from the condenser is the main source of cooling, thus restoring a large part of the generator losses to the steam system. Raw water added later to the boiler make-up is used to supplement the condensate, the cooler being so arranged in sections as to make this possible.



SINGLE-LINE DIAGRAM OF PART OF HIGH-TENSION SWITCHING CIRCUITS



CROSS-SECTION THROUGH TRANSFORMER AND SWITCHING SECTIONS OF PLANT

As the amount of condensate available for cooling decreases with the load more rapidly than the generator losses, an automatic valve is provided to return to the condenser part of the condensate leaving the cooler. The rapid circulation of this water results in the absorption of the necessary heat in the cooler.

It is understood that the designers of this plant are contemplating a further development of the generator cooling system by substituting nitrogen for air, thus entirely eliminating the fire risk.

Each generator is connected direct to a bank of three single-phase transformers, which raise the voltage from 6,000 to 60,000. There is not even a disconnecting switch between the generators and the transformers.

TABLE II—STATION DESIGN CONSTANTS, GENNEVILLIERS PLANT

Steam conditions at throttle:		
Pressure, lb. gage		313
Total temperature, deg. F.		705
Degree of superheat, deg. F.		280
Boiler room:		
Square feet of boiler heating surface per kw. station capacity		1.28
	Stirling	B. & W.
Square feet of heating surface per square foot of grate	34.3	36.3
Cubic feet of combustion space per square foot of grate	2.08	7.8
Square foot of superheater surface per square foot of heating surface	0.476	0.573
Square foot of economizer surface per square foot of heating surface	0.572	0.602
Square foot of air preheating surface per square foot of heating surface	0.857	0.844
Cubic feet of water per cubic foot of steam in boilers	3.24	2.21
Cubic feet of water in boilers per square foot of heating surface	0.127	0.090
Forced-draft fan motor output per square foot of grate; hp., normal rate of firing	0.261	0.294
Same, two-hour overload	0.364	0.406
Induced-draft fan motor output per square foot of grate; hp.; normal rate of firing	0.033	0.035
Same, two-hour overload	0.133	0.140
Turbine Room:		
Square feet of condensing surface per kw. capacity		0.941
Ratio of circulating pump capacity to condensate pump capacity		42

Each transformer is installed in a reinforced-concrete cell covered with a heavy slab which must be lifted to permit removal of the transformer. The usual precautions for the removal of oil and fumes in emergency are taken, and the water piping, gages, etc., are in an operating passage running the length of the transformer cells.

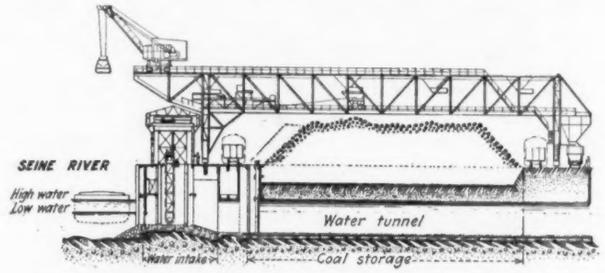
The high-tension switch house has been described as an American outdoor switchboard inclosed in a light reinforced-concrete structure. There are two main buses and one transfer bus. Each generator occupies one bus section with three feeders. The switching equipment, as well as the main transformers, are of General Electric make.

The generator oil switches are controlled by two sets of differential relays, one protecting the generator windings, the other the transformers and cables up to the oil switches. The outgoing underground feeders are also protected by differential relays. Each oil switch is set over a concrete pit, the object of which is to receive the oil in case of rupture of the tank and extinguish it if it is burning.

All the feeders are underground cables, three single-conductor cables, laid together in a concrete trough, being the arrangement adopted.

The supply of power for the auxiliaries is, in general, three-phase, although for the forced and induced-draft fans, the stokers and the coal-handling equipment 500-volt direct current is used. The three-phase voltage for the smaller motors is 220, and that for the larger motors 3,000. The regular main source of supply for these auxiliaries is the 60,000-volt bus, but provision for reserve is made by the installation of a storage battery and two 3,000-kw. house turbines. The latter will also be used at times of very light load.

In the above account of some of the important features of the Gennevilliers power plant the mechanical features have been emphasized as being less familiar to *Electrical World* readers than the electrical features. If more details are desired, particularly of the electrical equipment, they can be found in a booklet issued by the Union d'Electricité which will be available at a nominal price at the office of the *Revue Industrielle*, Paris.



CROSS-SECTION THROUGH COAL YARD AND LONGITUDINAL SECTION THROUGH INTAKE TUNNEL

The thanks of the editors of the *Electrical World* are due Col. E. Mercier, director of the Union d'Electricité for information regarding the design of the plant, for which he is responsible, and to R. Gasquet, editor-in-chief of the *Revue Industrielle*, for photographs and other illustrative materials.

HIGH-TENSION AND LOW-TENSION SWITCHING PANELS. SEE DIAGRAM, PAGE 269, FOR RELATION TO OTHER PARTS OF PLANT

Advertising—Its Value to Central Stations*

Why Some Advertising Falls Short—Logical Planning Essential—Getting the Public Viewpoint—Copy Preparation—Budgeting Expenditures—Amount of Advertising Appropriation

By W. J. REAGAN
Commercial Manager Utica Gas & Electric Company, Utica, N. Y.

ADVERTISING is playing an increasingly important part in the commercial activities of public utilities. A greater interest in public relations work is noticeable in every section of the country and the utilities are slowly coming out of the dark and turning the light on themselves. The electric light and power and gas companies are doing far more advertising than has ever been done by them before and a serious and intelligent bid is being made for public interest and good will. Advertising or publicity is an organized effort for creating or correcting the opinions or habits of the people. What we really buy when we buy advertising is mental impressions. This conception repeated is the power that builds good will.

Good will is gained primarily by good service. But hundreds of business men have proved that the growth of good will can be greatly accelerated by advertising. Moreover, your mental property—like your physical property—tends to depreciate. The average American is quick to notice poor service, prone to forget good service. You must keep him constantly reminded of the good service which he is enjoying and will continue to enjoy. Advertising is the most effectve way of doing this. In other words, advertising builds, maintains and increases the value of your mental property—property more important today than ever before in industrial history.

However, a great deal of effort and valuable space are being wasted because it misses the mark. Too many central-station men appear to believe that advertising consists of filling a given amount of white space with type and they judge the volume and the value of their advertising by the size of the bills that come in at the end of the month. Preparation of good "ad copy" is given too little attention; frequently there is no definite plan mapped out beforehand and the results are disappointing.

MAKING ADVERTISING PAY

One way to make advertising pay the most is to employ a trained advertising or publicity man to take charge of the advertising and public relations work. Provided your company cannot afford to employ a man for his full time, get a part-time man. Frequently it is possible to employ some one connected with a local newspaper—an editor or reporter—to do the work on a part-time basis.

And when you get an advertising man, make him more than a mere explainer of policies long after they are formulated, or actually put into effect. Advise with him as to public relations. Tell him in advance what you have in mind and ask him how the newspapers and the public will take it. Copy should be written by some one who understands the people who are to be influenced. It is no handicap for the copy writer to learn our business thoroughly, but to understand people is much more important. Consequently, it is quite possible for advertising agencies to write better copy than anyone in the utility's organization, unless a special copy department is maintained.

When the agency's services are available, the plants are visited by their representative and the functions of the meterman, lineman, test man, trouble shooter, service department, ledger department, treasurer's system, the hydraulic plant, the watershed, the carrier current system are investigated and visualized. After several weeks of searching, talking to and questioning employees, the agency man returns to his own organization, relates his impressions and, after many conferences, the angle to be exploited is decided on. Thereafter, the copy man, space man, the illustrator and the type man are charged with their respective assignments, and something worth while is produced.

Incidental to the agency man's tour of inspection, he discovers something wrong, a glaring inconsistency, opposing his ideal of the service which he intended to broadcast. The utility organization, through the proper channels, will receive his constructive criticism, as coming from the "man in the street." His point of view should be valuable. Many times suggestions of this nature when followed are productive of much good to the organization and service alike.

VALUE OF THE OUTSIDE PUBLICITY MAN

Similar service is sadly lacking in most instances where the publicity man is an established part of the organization. His constant association with various department heads establishes a familiarity which tends to tolerate some breaches of discipline and departures from the formulated policies. This state of affairs is detrimental to the utility's well being. In other words, the publicity man gets into a rut. Opportunities to receive, on short notice, the approval of the executive, or his company council, in order that some explanatory write-up may be published on a mooted point which has come to his attention, or to discuss innovations for future development of service, are fewer, after the officers of the company begin to think that they cannot be bothered further with these matters. He is absorbed in the company's routine. He loses his initiative, his critical viewpoint, and his value is unconsciously curtailed.

On the other hand, it is not an ideal condition for the management of the advertising to be in the hands

*From a paper presented at the commercial section meeting of the Empire State Gas & Electric Association at Lake George, N. Y.

of an outside organization. Every one knows there is much more to advertising than the printed advertisement, and a person should be in command who knows both the public and the business. Such a manager uses the outside experts merely as assistants and counselors.

The initial step for any company to take before attempting publicity is to analyze its service and determine whether it is giving the best service that it can under existing conditions. This does not mean service equal to that of any other company regardless of financial conditions. It means the best possible service under the circumstances. If the facts in the situation prove that the company's condition permits no improvement in the existing service, the company need not fear to begin advertising. The general public seldom will demand better service than that to which it is entitled if it knows the facts.

BACKING UP A CAMPAIGN

Having disposed of the question of service, the management should subject itself and the entire company personnel to close scrutiny in regard to its attitude toward the public. Concretely, the central-station manager who advertises one policy in the newspapers and permits his employees to carry it out half-heartedly is wasting money solely because they have not had the plan explained. His employees come in closer contact with his customers than the newspapers. If they tell the same story as the advertising, the chain is complete and the advertising in the papers and the advertising by employees supplement and strengthen each other.

Copy should not be written until the company's service—as previously described—has been fully attained, and it should be an expression of that service. It won't do for advertisements to be simply strung together without thought of their bearing on one another, or their suitability to the purpose of the campaign. A so-called "clever" idea is adopted as one advertisement. Next another idea is submitted by someone without knowing what the advertiser is trying to accomplish and it is purchased. Such advertising is like trying to kill a deer by shooting into a thicket in any direction, upon the theory that game may be hidden there, or like trying to build a house by throwing a brick here and another there, instead of placing one upon another with mortar between.

It is not necessary that advertisements be made into an obvious series and labeled "1," "2," "3," etc. Indeed, that might be done and still the real vital connection be absent. What is desirable is that the manager shall see the connection himself, that he shall have a distinct purpose in his campaign, and that he shall build his advertisements with a clear idea as to how each one is going to push the campaign a little nearer to the goal.

The utility problem is intricate and involved and is difficult for the layman to understand. The objective to be attained should be a clear, concise explanation of the functions of the various departments of our organization, service and corporate being, couched in the newsy style of the newspaper reporter, in accordance with the angle of the "man in the street." In following this suggestion down, I will mention some of the subjects which our company has exploited in its various campaigns.

We began with a clear statement of what we proposed to publish—about our physical properties; distribution system, wires, poles, transformers, meters, large coal piles, the yearly cost of the coal we burn; our service men, meter readers, test men, linemen, stokers, switchboard tenders; the training these men receive; the risk they assume to insure uninterrupted service; our policy in extending gas mains and the electric distribution system.

NEWSPAPERS MOST DIRECT ROUTE

The newspaper is used by more advertisers, reaches more people, and reaches them more often, than any other advertising medium. It produces the maximum results. Many times the subject matter will be of the moment, necessitating publication the same day or thereabouts. It is a logical conclusion, therefore, that in the interest of sustained attention, quick service and widespread clientele the newspaper can almost be relied upon as the sole medium of contact.

Probably the most wasteful expenditure of money in the advertising field is that for space in programs, souvenir booklets, special editions and publications, without bona-fide subscription lists. Beware of all of them.

The recognition of the principle of correct budgeting has taken advertising out of the field of sporadic or uncertain expenditures. The utility can know accurately from clear and scientific analysis just what it is investing in advertising and why and that the total amount so invested is absolutely based on a definite program.

Under the old idea of advertising as mere paid publicity, it was entirely natural that it should be regarded as something that could be carried on intermittently, but advertising for the education of the public mind, the kind of advertising that must be done today to drive the public through the door of understanding and co-operation, needs to be carefully planned and unfailingly carried out.

AMOUNT OF APPROPRIATION FOR ADVERTISING

Department stores of recognized standing do not plan to spend more than 2 per cent of their gross receipts per year for advertising. Businesses that are building up must spend as high as 5 per cent. Merchandisers of class and distinction spend 7 per cent. Dealers in new electrical appliances are in the latter class. However, they are favored through the manufacturers' advertising and the ratio is consequently less. Appropriations for the national advertising of well-known articles are shown by the following percentages of gross sales:

	Per Cent		Per Cent
Arrow collars	3½	Kodaks	3
Cadillac automobiles	1	Northern Pacific Railroad	1 9
Colgate's	2	Dutch cleanser	10
Fatima cigarettes	5	Ruud heater	2½–3½
Sears-Roebuck	10	Union Pacific Railroad	2½

In the utility business it is conservatively estimated that one-third of the total new business appropriation can be budgeted for an advertising fund. Experience has shown that the newspapers should receive better than one-half of the advertising appropriation. A good formula which closely checks the foregoing states that if central stations will intelligently apply only 1 to 1.5 per cent to their annual gross receipts to advertising, assigning one-half to good will and one-half to merchandising, they can take advantage of every form of co-operative help to the fullest extent and put themselves in the strongest possible position.

What Determines the Deadliness of a Shock

Physiological and Chemical Effects of Electric Current on Human Body Discussed—Observations Based on Actual and Extensive Tests—Suggestions on Rescuing Shocked Person

By GEORGE M. OGLE*
Power representative, Public Service Electric Company, Newark, N. J.

DEATH by electricity is caused from paralysis of all muscles, including the involuntary muscles of the heart, lungs, etc., as well as destruction to the mental and nervous systems of the body. It has been found by exhaustive research† work that a current of 1 amp. passing through the brain or other vital organs of the body will in most cases produce death if allowed to act for only a short period of time, and it is therefore evident that it is the amperage, together with the energy dissipated in the body that actually destroys life. On the other hand, the element of voltage enters, inasmuch as the resisting power of the human body is very high and it requires a voltage comparatively large or small, depending entirely upon the resistance and contacts, to force this amount of current through a circuit in which the body and its contacts constitute the resistance.

The resistance of the human body is a variable factor and depends largely upon the applied voltage, inasmuch as the resistance measured from hand to hand with precision instruments on potentials not in excess of 10 volts will show approximately 40,000 ohms, while if this potential is increased to 110 volts the resistance breaks down to some extent and becomes nearly 10,000 ohms.

The question naturally arises as to the reason for this difference of resistance in the same body under different potentials. This is explained by the high resistance of the epidermis. If the skin is removed from the human body and thoroughly dried, it becomes a very good insulator of high resistance, and under low voltage with dry contact the pressure is not strong enough to break down the skin's resisting power, while, in the cases of higher voltages through low resistance contacts, the epidermis generally breaks down, allowing the current to enter into the blood and muscular tissues of the body. Due to the normal animal salts contained in the blood and muscular tissues of the average healthy person, which are, by virtue of their liquid and physical form, of very low ohmic resistance, excellent paths are available for the flow of heavy currents when the body is acted upon by medium voltages. To illustrate that the skin is our chief protection from death when placed in an electrical circuit, it is only necessary to consider the human body being severely cut, or the skin opened up in such a way that direct electrical contact could be made

GOOD CLEARANCES AND INCLOSED PANELS WILL ELIMINATE MANY HAZARDS

A.—A person is held paralyzed and speechless on a 440-volt circuit, making his chance of recovery very remote.

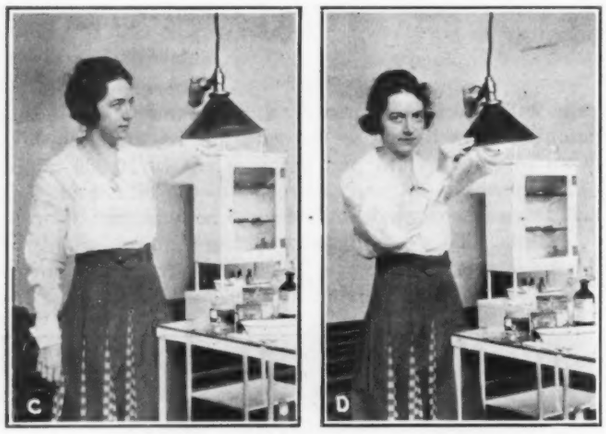
B.—Dry clothing can be used as an insulator in an emergency when rescuing a person; in no case should the bare hands be used.

*Formerly electrical engineer, Vulcan Iron Works.

†Based on observations in the field and during electrocution of criminals at Sing Sing.

to the main blood arteries, in which case the extremely low voltage of 50 would prove to be a death-dealing potential. Furthermore, the resistance breaks down very rapidly with even higher voltages, as may be seen in the fact that the resistance instruments will show the body to have about 200 ohms resistance under a potential of 2,000 volts with moistened contacts.

It is most interesting to note that the resistance of the average woman's body is considerably less than that of a man's, for the reason that her hands are very rarely calloused, her skin softer and her general physical condi-



SAFETY RULES SHOULD PREVAIL IN THE HOME
C.—One hand rule should be enforced even on 110-volt circuits.
D.—Proper installation will eliminate this hazard.

tion more delicate than that of the male sex, which allows a stipulated voltage to send a greater quantity of current through her body, due to the low breakdown resistance of her skin.

The resistance of a given person varies largely, from time to time, in accordance with their blood and skin conditions, as well as the percentage of moisture or perspiration emanated through the epidermis, which means, if taken technically, that a man whose body is thoroughly dry may stand a considerably higher voltage than he could otherwise withstand on a hot summer day when wet with perspiration, which forms an excellent conductor, due to its contents of salt matter. For this reason, a person may be electrocuted from a certain electrical circuit, while the next one to come in contact with it would only be slightly hurt, showing conclusively that the voltage is only one of the three important functions when studying the danger of any electrical circuit.

As the general public understands the voltage of an electrical circuit more clearly than that of the other two important factors, below will be found a table of commercial line voltages, for both direct and alternating current, which shows the general result on the average person, where the amperage flow through the body is restricted only by the ordinary accidental dry contact.

Electrical currents on the human body produce one or more of the following conditions, depending upon the source of energy, voltage applied and resistance of the body through points of contact:

1. Painful shocks to nervous system.
2. Unconsciousness.
3. Paralysis of the brain.
4. Paralysis of all voluntary and involuntary organs.
5. Hemolysis, or blood disintegration.
6. Creating of excessive heat in the body.
7. Burning of body at points of contact.
8. Painful muscular contractions.
9. Mental and nervous deficiency.
10. Total inability.
11. Death.
12. Cremation.

When a person is subjected to an electrical current under a potential of 2,000 volts with good contacts the feeling may be described as that of an extremely superpowerful blow at all points of the body and the vanishing to complete unconsciousness, all of which takes place in an infinitely small fraction of time. Other characteristics are that all muscles in the body instantly contract, causing severe contortions of all limbs, fingers, toes, mouth, face and eyes and, if it is applied for any length of time, burning rapidly develops at the points of contact. Under a pressure of 2,000 volts with excellent contact the average body would receive about 10 amp., and if this amount of current is allowed to act on the body for thirty seconds there would be severe burning of the flesh, even to the extent that the skin could well be classified as in a "charcoal state."

If temperatures are taken during and immediately after such an application of electricity, it will be found that the electrodes making contact may reach a temperature high enough to melt copper (1,940 deg. F.) and that the average body temperature will be in the neighborhood of 140 deg. F., which, if this temperature rise alone were only considered, would show that it would practically be impossible to restore life or reinstigate blood circulation under such abnormally high body temperature.

A more practical and probably better understood illustration of the death-dealing blow a person receives when a current of 10 amp. under a pressure of 2,000 volts is passed through the body may be seen in the fact that when this amount of electricity is transferred into mechanical power it would be at the rate of 884,400 ft.lb. per minute, or enough electrical energy to light 800 electric lights in the average home. Death and some of the above hazardous results may be incurred on circuits of considerably lower voltage if the contact with the body is such that its ohmic resistance is low, such as is the case when internal contact is made with the blood, etc.

High-powered circuits of 33,000 volts and above will

Volts	Classification	Remarks
110	Not usually dangerous	Will produce shocks to the nervous system, causing muscular reactions.
220	Not usually dangerous	A voltage not to be experimented with in determining its effects or feelings upon the body. May produce slight burning of body at points of contact. Will produce severe shocks to the nervous and muscular systems.
440	Semi-dangerous	May cause death where moist, accidental contacts are made. Produces severe shocks to the nervous system. May cause paralysis of muscles, holding victim speechless in circuit. Often produces bad electrical burns.
550	Semi-dangerous	About the same as the 440-volt system.
1,100	Dangerous	Produces unconsciousness and total paralysis of all muscular and nervous systems and in most cases will cause death or very severe burns upon very slight contact.
2,200 and over	Dangerous	Will destroy life. Produces unconsciousness and total paralysis of the muscular system, blood disintegration and the cremating of body, if left in circuit. Extreme care should be exercised in the handling of such currents.

practically destroy the body past recognition by cremation within a fraction of a second. However, cases are known where currents have passed through the body in amounts great enough to burn the entire limbs off, or to the extent that they would have to be amputated, and yet the subject has regained consciousness and revived. Other cases have shown that even though consciousness and life are restored, which can only be done provided the current is instantaneously removed or has not passed through the brain or other vital organs, the person has been left a total imbecile or mentally deficient, due to the tremendous shock to their mental system.

There are other cases where contact is made with low potentials of approximately 550 volts which cause muscular contractions of the hands or even greater gripping on the conductors, and while this voltage and contact may not send a deadly current through the body at the instant of making contact, the person, in most cases, would be held in circuit until life was extinct, unless seen and freed by a bystander. Even though these low voltages under favorable contact do not produce instantaneous unconsciousness, care should be taken for reason that they often prove fatal, inasmuch as a person subjected to this low potential becomes muscularly paralyzed and consequently speechless, thus cutting him off from helping himself or summoning assistance.

It is not uncommon to hear of a person being killed on 110-volt lighting circuits, but in most cases, if the real truth is known, it will be developed that there was an electrical defect in the wiring whereby the high voltage current was allowed to enter into the supposed 110-volt circuit, or that the person actually died of some physical defect, such as heart failure, etc., which may or may not have been actuated by the low voltage electrical shock.

The exact line of demarkation as to just what current passing through the body will prove fatal has been a question that has outlasted many controversies, and up to the present time no satisfactory solution of this problem has evidenced itself for reason of variable physical conditions and that such exacting data could only be collected upon the sacrifice of human life in a most painful and inhumane way. We do know, however, that a current of 1 amp. passing through the brain or other vital organs will in most cases prove fatal.

Electricity, in some ways, may be well compared with most poisonous drugs. A certain dose of a given poison may kill a particular person, while in the next case an equal dose to another person, with the immediate aid of medical treatment and quickly freeing the stomach of its poisonous contents, may not prove fatal but only place the victim in a critical condition for a short time, leaving him with no after effects. Electricity differs from the above in that if the proper amount of current is passed through the vital organs there is no salvation.

TESTS FOR CAUSE OF DEATH

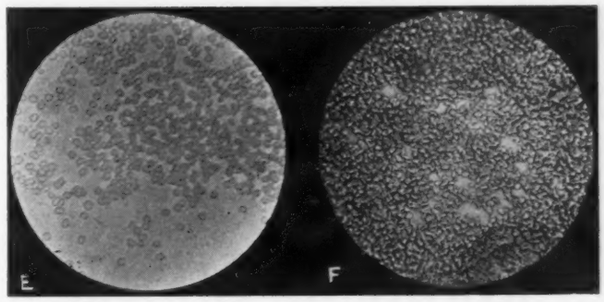
Serious legal debates often exist over whether a person was electrocuted or died of other natural causes. A superficial way to determine if death was caused by electrical currents is to examine the body for burns at points where the victim came in contact with the live wires, together with the fact that the teeth very rapidly lose their luster and that rigidness of the body after death first sets in at the joints closest to points of contact. For greater technical detail and more paramount characteristics of an electrical death the body should be examined in one of the three following ways:

1. The temperature rise in the body, which can easily be determined by immediately taking the victim's temperature.

2. For heamolysis or disintegration of the blood corpuscles, which are clearly shown upon microscopic examination.

3. By the peculiar foggy eye condition with a star fracture of the eye lens.

Research work and literature on the subject of electrical currents on the human body is limited, chiefly due to the fact that such data can only be compiled as the result of casualties or at the expense of human life. Two semi-technical points that will be of interest to those familiar with electrical currents are, first, the fact that a normal, healthy person cannot withstand the voltage that can be applied to one affected with tuberculosis or other chronic diseases, in which case the blood does not contain as much salt matter as is found in the normal healthy person, resulting in higher ohmic resistance of the body and consequently higher voltages to send a fatal current through the diseased person, and, second, when a human body is placed in an alternating electrical circuit it has capacity and will tend to produce a leading phase displacement between the impressed voltage and the resulting current, causing a leading power factor.



BLOOD TESTS WILL OFTEN SHOW CAUSE OF DEATH

E.—Normal human blood corpuscles magnified 460 diameters.
F.—Disintegrated human blood corpuscles after electrocution magnified 460 diameter.

High frequency currents are chiefly used in electrotherapeutics and radio work. Medical science has used to great advantage high frequency currents under different conditions for treatment of various diseases, while the high voltage and high frequency apparatus has also become very prominent in the use of wireless telegraphy. These currents are not to be feared or classified as dangerous, due to their extremely high frequency and the pre-eminent characteristic of the body to resist or restrict the flow of a current having such a high number of cycles per second.

Another peculiar phenomenon is that certain currents passing through different parts of the body after death will produce various muscular movements, giving most pronounced indication of life. In sending such currents through the body after death it is most interesting to note the higher resistance of the body, which continually becomes greater with the gradual loss of blood heat. Medical science at various times has given serious consideration to the peculiar action of the heart after death by the application of even small 1-volt bat-

tery currents, which will cause it to pump periodically as the current is applied. Such action, however, is only muscular contraction and relaxation upon the closing and opening of the electrical circuit and this action of the heart will completely cease upon the removal of the current, showing that such heart actions are neither accelerating, self-supporting nor lifelike.

Prominent medical men often maintain that they can revive a person after a most severe and fatal current has passed through the body, provided they are given the victim immediately upon removal from the circuit. Such statements are carelessly made and are generally relative to other conditions, for if the proper amount of electrical energy has been dissipated in the human body we encounter blood disintegration and temperatures that in themselves make the restoring of life impossible.

The average death caused from electrical current is usually traceable to the neglect on the part of the one involved. Some accidents are caused, however, by people carelessly coming in contact with fallen wires or tampering ignorantly with high-power electrical circuits. Whenever or however such an accident may happen, the best and most logical thing for the bystander to do is to make immediate efforts to have the current cut off by means of the closest switch, but if this is not possible within a very short time element, other means should be resorted to immediately. Never make an attempt to free the victom with bare hands, as it may cause severe burns or electrocution by receiving a portion of the current. Where it is necessary to free a victim from a live electrical circuit, it can best and most safely be done by using a piece of dry wood or rubber gloves, provided the high-powered circuit is less than 10,000 volts. If neither of these two articles can immediately be found, it is comparatively safe to remove dry clothing from your own body, throwing it around the neck or other part of the victin and freeing him from the circuit in this manner.

In any event, it is most essential to remember that the very essence of saving the victim's life lies in the rapidity of time in which he is freed from the line circuit, and if unconscious or burned when removed, medical advice should be sought immediately, using artificial respiration until such time as the doctor arrives.

Material Increase in Central-Station Output During May

CENTRAL-STATION operations experienced a remarkable expansion during May. Reports received by the *Electrical World* for that month from central generating and distributing companies representing 83 per cent of the installed rating of the country indicate that the average daily output of such companies was more than 4,000,000 kw.-hr. in excess of that reported for April.

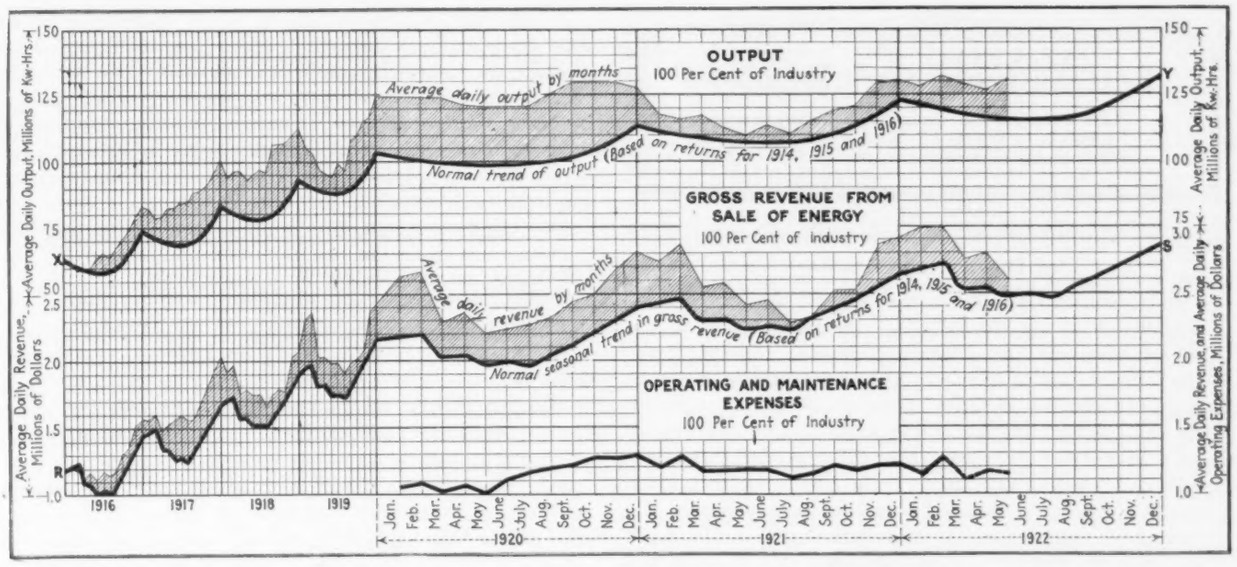
Three conditions probably contributed to this unusual increase in operations at this season of the year. First, the government reports indicate that, with the exception of leather, every primary industry in the country increased operations over those of April, with a resulting increase in the industrial load of the central stations of the country. Second, thousands of new residential lighting customers were added to the central-station lines during May owing to the housing construction going on throughout the country. The energy consumption by these new customers was, in all probability almost sufficient to overcome the usual decrease in lighting requirements caused by the advancing season and by the operation of the daylight-saving law in many towns and cities. The irrigation load of the Western distributing companies probably nearly reached its peak during May, and a largely increased consumption of electrical energy by this class of consumers was the third cause for the upward trend in energy consumption by the country as a whole.

The class of central-station customers which increased its energy requirements during May is also discernible on a close study of the figures for gross revenue. While the total of kilowatt-hours sold by the central stations was materially above that sold during April, yet the average daily gross revenue was 6.8 per cent less than that reported for April. The increased output was, therefore, apparently distributed in large part among the low-revenue customers, which fully bears out the government reports of increased industrial activity throughout the country.

Expressing the financial phase of the returns in terms of the operating ratio, or ratio of operating expenses to gross revenue from sale of energy, gives further evidence of the material increase in the low-revenue load and probable decrease in the high-revenue or lighting load during the first five months of the year. In May the operating ratio of companies having steam-electric generating plants only, taken in the aggregate, was 53.7 per cent, as against 45.7 per cent in January of this year. Evidence of the tendency toward financial prosperity in the electric light and power industry,

TABLE I—CENTRAL STATION RETURNS FOR THREE MONTHS

	Percentage of Installed Ratings Represented	Kw.-Hr. Output (Companies Reporting)			Percentage of Installed Ratings Represented	Revenue from the Sale of Energy (Companies Reporting)				Percentage of Installed Ratings Represented	Operating and Maintenance Expenses (Companies reporting)			OPERATING RATIO					
		1922 Thousands	1921 Thousands	Per Cent Increase		1922 Thousands	1921 Thousands	Per Cent Increase			1922 Thousands of Dollars	1921 Thousands of Dollars	Per Cent Increase	Steam Plants		Hydro Plants		Combined Systems of Steam and Hydro	
														1922	1921	1922	1921	1922	1921
Mar.	78	3,154,993	2,781,731	13.4	72	$61,148	$56,047	9.1	Mar.	55	19,199	19,897	−3.5	48.3	54.6	27.1	21.0	40.7	42.8
Apr.	82	3,121,167	2,769,089	12.7	75	62,784	58,483	7.4	Apr.	61	21,403	21,666	−1.2	48.3	53.9	25.3	27.6	34.8	47.7
May	83	3,367,998	2,800,374	20.1	76	61,134	56,603	8.0	May	62	22,060	21,669	1.8	53.7	58.1	25.1	22.4	43.3	46.0


OUTPUT
100 Per Cent of Industry
Average daily output by months
Normal trend of output (Based on returns for 1914, 1915 and 1916)
GROSS REVENUE FROM SALE OF ENERGY
100 Per Cent of Industry
Average daily revenue by months
Normal seasonal trend in gross revenue (Based on returns for 1914, 1915 and 1916)
OPERATING AND MAINTENANCE EXPENSES
100 Per Cent of Industry
Average Daily Output, Millions of Kw.-Hrs.
Average Daily Revenue, Millions of Dollars
Average Daily Revenue and Average Daily Operating Expenses, Millions of Dollars
1916
1917
1918
1919
1920
1921
1922

however, is shown by the fact that the operating ratio decreased from 58.1 per cent in May of 1921 to 53.7 per cent in May of this year.

The accompanying diagram of central-station operations may also be considered as a barometer of business conditions in the electric light and power industry. The line *X-Y* shows the normal trend of output based on returns of central-station operations during the years 1914, 1915 and 1916 received by the *Electrical World*, which are assumed to represent years of normal operations in the industry. The curves indicate that the central-station industry is operating at several points above the normal trend of output and gross revenue as established in 1914, 1915 and 1916. The energy output of the industry during the present year appears to be tending toward a larger monthly increase than would be indicated by the curve of normal seasonal trend. The gross revenue appears to be following the normal seasonal trend curve very closely.

Apparently every section of the country experienced an acceleration in industrial activity during May and a consequent increase in industrial energy requirements. To this was added a materially increased irrigation load throughout the West.

TABLE II—CENTRAL-STATION RETURNS BY SECTIONS OVER A THREE-MONTH PERIOD

Month	New England States				Atlantic States				North Central States				South Central States				Pacific and Mountain States		
	Percentage of Installed Ratings Represented	1922 Thousands	1921 Thousands	Per Cent Increase	Percentage of Installed Ratings Represented	1922 Thousands	1921 Thousands	Per Cent Increase	Percentage of Installed Ratings Represented	1922 Thousands	1921 Thousands	Per Cent Increase	Percentage of Installed Ratings Represented	1922 Thousands	1921 Thousands	Per Cent Increase	Percentage of Installed Ratings Represented	1922 Thousands	1921 Thousands	Per Cent Increase
KW.-HR. OUTPUT:																			
Mar.	82	258,142	210,107	22.9	81	1,177,876	1,024,161	15.0	70	968,229	86 2,240	12.2	60	160,656	145,320	10.6	94	590,090	539,903	9.3
Apr.	81	231,874	205,089	13.0	82	1,129,200	979,666	15.3	80	1,019,170	910,482	11.9	63	158,524	137,240	15.5	94	582,400	536,612	8.5
May	82	242,154	198,888	21.8	83	1,204,529	982,362	22.6	82	1,109,374	934,895	18.7	62	163,924	138,089	18.7	95	648,017	546,140	18.6
REVENUE:																			
Mar.	82	$6,366	$5,947	7.0	75	$23,798	$21,617	10.1	57	$17,411	$15,726	11.0	60	$4,214	$4,048	4.1	94	$9,359	$8,709	7.5
Apr.	81	6,130	5,807	5.6	76	23,809	21,847	9.0	67	19,536	18,017	8.4	62	4,123	3,928	5.0	94	9,186	8,880	3.5
May	82	5,799	5,508	5.2	76	22,557	21,129	6.8	69	18,960	17,048	11.2	62	4,174	3,795	9.9	95	9,644	9,123	5.7
OPERATING EXPENSES:																			
Mar.	53	$1,800	$1,741	3.4	56	$7,140	$7,345	−2.8	38	$4,884	$5,188	−5.9	59	$2,097	$2,313	−9.3	93	$3,278	$3,310	−0.9
Apr.	53	1,621	1,655	−2.1	56	7,322	7,295	0.3	53	7,148	7,259	−5.3	61	2,063	2,075	−0.5	93	3,249	3,382	−3.9
May	53	1,608	1,682	−4.4	57	7,518	7,363	2.1	55	7,675	7,202	6.6	61	1,863	2,018	−7.7	93	3,396	3,404	0.2

TABLE III—AGGREGATE OPERATING RATIO OF COMPANIES REPORTING DATA MONTHLY TO THE "ELECTRICAL WORLD"

Type of Generating Plant and Month	New England States				Atlantic States				North Central States				South Central States				Mountain and Pacific States			
			Average for Previous 12 Months				Average for Previous 12 Months				Average for Previous 12 Months				Average for Previous 12 Months				Average for Previous 12 Months	
	1922	1921	1922	1921	1922	1921	1922	1921	1922	1921	1922	1921	1922	1921	1922	1921	1922	1921	1922	1921
Steam Plants:																				
March	54.6	62.1	58.9	66.6	48.0	52.0	50.9	56.8	47.8	57.5	52.8	62.4	47.2	52.7	50.3	55.8	47.3	56.3	49.0	55.0
April	49.5	62.5	57.5	66.5	47.3	51.5	50.7	56.7	48.7	55.2	52.3	61.9	50.6	54.7	50.0	56.0	47.4	54.5	48.4	55.0
May	58.8	62.4	57.1	66.0	54.4	58.0	50.6	56.6	50.6	58.8	61.5	52.0	54.1	56.1	50.1	55.1	54.7	56.3	48.8	55.3
Hydro Plants:																				
March	36.3	34.1	31.3	45.0	23.9	27.8	18.2	22.4	26.0	25.6	22.7	21.8	37.0	37.3	35.6	34.2	28.6	36.0	27.0	25.5
April	38.4	37.0	33.1	44.1	21.0	24.5	18.5	22.8	23.6	24.3	22.6	22.1	37.2	22.4	36.0	34.2	27.5	31.7	26.9	26.4
May	32.0	28.7	33.2	42.1	16.2	18.0	18.5	22.7	22.1	22.7	22.3	22.6	33.0	28.0	36.4	34.4	35.2	32.8	27.2	26.8
Combined Systems of Steam and Hydro Plants:																				
March	46.7	46.0	52.8	52.7	49.3	52.4	44.5	49.0	43.3	49.3	46.7	55.8	41.6	38.4	43.8	45.4	32.6	34.1	37.2	40.8
April	43.7	45.9	52.6	52.4	47.7	50.6	45.1	49.7	47.8	52.7	46.9	55.8	39.8	43.7	43.5	45.1	33.7	38.2	36.8	41.0
May	46.2	49.4	52.4	52.5	44.8	45.3	45.4	49.5	50.6	55.1	47.7	55.8	38.5	44.5	43.1	45.3	31.3	34.4	36.6	40.7

Letters from Our Readers

A Place Set Apart for Suggestions, Comments and Criticisms, to Which All Men of the Electrical Industry Are Cordially Invited to Contribute

Should Impress Public with Value of Decorative Lighting

To the Editors of the Electrical World:

Referring to the frontispiece on page 1160 of the June 10 issue of the *Electrical World*, showing electrical decorations in connection with the recent Knights Templars conclave in New Orleans, it is my opinion that the central station, contractor-dealer and jobber should co-operate generally in bringing about the lavish use of electric service in civic events of this kind, thereby impressing upon the public unconsciously the tremendous importance of the industry. Aside from this, such decorative accomplishments create considerable business for the electrical industry as a whole. There were approximately 26,000 lamps used in the Knights Templars decorations. All of the material (streamers, etc.) has been acquired by the American Legion and will be reinstalled for the convention which it will hold in New Orleans in October, 1922. During the great war, with its shortage of power and decorative material of this kind, there was naturally a tendency to curtail the installation of large electrical displays. As business again becomes normal the industry as a whole should turn its attention toward developing them.

W. E. CLEMENT,
Commercial Agent.

New Orleans Railway & Light Company,
New Orleans, La.

Evolution Will Eliminate Excess Varieties

To the Editors of the Electrical World:

I have just read Mr. Sargent's article which appeared in the *Electrical World* of June 10. There are undoubtedly unnecessary duplications in wiring-device lines. Some of these could well be made obsolete, and in fact I believe that manufacturers will continue to drop from their lists articles for which they have small sales.

We have from time to time dropped many catalog numbers. In fact, it is our policy to do this whenever sales on any device show a permanent reduction to a point where further production makes them unprofitable. Sometime, however, although the very small sale of such an article makes it unprofitable, at the same time the small existing demand is one that manufacturers rather like to fill, believing that there is considerable advantage in accommodating the user, because of the expectation that he will also buy other material if he finds that all of his requirements are satisfied by any one manufacturer.

My personal opinion is that a proper balance will naturally be maintained not only by manufacturers but by jobbers as well, and that when any particular article becomes to them an unprofitable one they will drop it. I should be inclined to doubt the success of any proposed concerted management on the part of manufacturers to eliminate certain lines having a comparatively small sale. If there was a demand large enough to make it interesting to any one manufacturer, there would always be some one ready to produce it.

Production of any article in small quantities naturally leads to high cost, and, of course, to high selling price. Therefore it seems to me that the tendency of manufacturers to concentrate on lines which afford a volume for production is naturally going to produce some articles which are manufactured in volume at a lower cost, and that these articles will compete with and eventually supplant any article for which there is a decreasing demand and which can be replaced with whatever happens to be the popular device of the period.

During any such evolution there are bound to remain some imperative demands for peculiar devices for which the user will be entirely willing to pay comparatively high prices. Manufacturers will continue to supply these demands so long as the user is unable to correct his requirements and satisfy them by use of some article which the manufacturer is already producing in volume and selling at lower prices.

My reasoning may seem a little bit hazy, but what I am getting at is that the laws of evolution and survival of the fittest will take care of most of our problems.

BY A MANUFACTURER.

The Jobber and His Profit

To the Editors of the Electrical World:

I have read with considerable interest the article published in a recent number of the *Electrical World* entitled "A Study of Jobbers' Sales and Costs," and I think we are all under obligations to you for advocating our case so ably.

The outstanding question might be summed up in the words "Why do they do it?" I think we jobbers are largely to blame for our own predicament, because it is an old saying of the manufacturers that the more profit they give us the more cheaply we sell our goods to our customers. In other words, the jobbers will not keep the profit the manufacturers are willing to allow them. A partial, though not complete, answer to this is that if the manufacturers would quit creating so many new jobbers and would quit encouraging non-electrical jobbers to handle electrical material as a side line, it would be easier for us to keep some of the profit which they are willing to give us.

I could name, for instance, a prominent manufacturer of dry batteries whose products we used to order in carload lots. He began making distributors out of hardware stores, mill-supply houses, and what-nots, and the result is that in our unalterable determination to retain our profit on his line and not to cut his prices, we have seen the business pass away from us, until now it is barely a third of what it was ten years ago.

Frankly, I do not know the end, unless it be that the margin of profit on electrical supplies will ultimately go so low that the great surplus of jobbers now existing will be forced out of business and the line will no longer be sufficiently attractive to non-electrical jobbers to encourage them to handle electrical goods even as a side line. Perhaps the industry will resolve itself into different classes of specialists, some of whom will handle house-wiring material only, some household devices only, others catering to industrial plants only, and so on, so that their respective costs of doing business may be properly apportioned to the several lines of goods and the gross margin of profit applying to these different lines.

W. R. HERSTEIN,
Vice-President and General Manager.

Electric Supply Company,
Memphis, Tenn.

Industrial and Station Practice

Installation, Operation, Test and Repair of
Generating and Distribution Equipment and Methods of Economically Utilizing
Electrical Energy in Mills and Factories

Coal Purchase Specifications Placed on Rational Basis*

Cost of Handling, Storage and Other Factors Influence Characteristics of Coal Used—Curves and Formulas Given for Determining Coal Values

IN PURCHASING coal the object should not be to get the most coal or the largest number of B.t.u. for a dollar, but to get coal which, when used in the plant for which it is bought, will enable that plant to deliver the required amount of its products for the lowest cost when both operating and investment costs are considered. The factors that determine the value of a certain coal in any given plant are as follows:

1. The cost in the bunkers of the coal required to produce a given number of B.t.u. in the steam.
2. The relative investment in boiler plant, including coal-handling and ash-handling machinery, land, buildings, etc.
3. The cost of handling and disposal of refuse.
4. The relative cost of fireroom labor with coals different in quality.
5. The cost of carrying banked boilers varying with quality of coal.
6. The clinkering tendencies of the coal.

The application of these factors is shown by the accompanying curves and formulas, examples being worked out to illustrate specific cases. The formulas are applicable to all types of coal-burning equipment. The curves, however, are based only on operating results with underfeed stokers.

After deciding upon the supply from which the coal is to be drawn, as, for instance, the semi-bituminous field, the selection of the coal possessing the characteristics most desired remains. Experience in the operation of the plants under consideration has shown that the most satisfactory results can be obtained from coals having the following characteristics: (1) A volatile content less than 20 per cent; (2) as little ash as possible; (3) an ash fusion temperature not less than 2,450 deg. F.; (4) at least 25 per cent of the coal should be capable of being stored for nine months without serious trouble from spontaneous combustion.

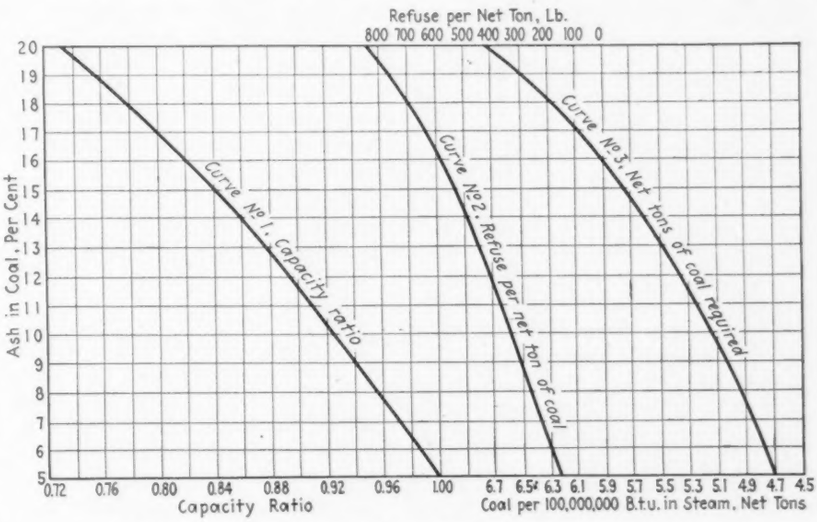
Having selected from the coals offered those which, from consideration of price, quality, etc., seem to be most suitable, sample cargoes of these coals are obtained and subjected to a boiler test which weeds out a number of coals that laboratory tests may have indicated would be satisfactory.

We now have before us a number of coals offered at various prices, all of which our tests indicate will give satisfactory results. It still remains to determine their relative values.

All the six factors first enumerated, with the exception of the last one, bear a very definite relation to the percentage of ash in the coal, and an attempt has been made in the accompanying curves and formulas to give a method by means of which a comparison can be made of the value of a coal of any given analysis and that of a coal containing 5 per cent of ash. The ratio of the maximum capacity of the boiler plant with 20 per cent ash coal to the maximum capacity of the boiler plant with 5 per cent ash is called the capacity ratio and is shown by curve No. 1. The pounds of refuse per ton from x per cent ash coal is given by curve No. 2. Curve No. 3 shows the tons of coal with x per cent ash to produce 100,000,000 B.t.u. in steam.

In these curves no account has been taken of the effect on coal value of extra fireroom labor (other than that involved in handling and disposal of ashes), extra cost of operating banked boilers, or clinkering tendencies of the ash. The reason for this is that the first two of these items in most plants are a very small proportion of the total effect on coal value of changes in ash percentage, and in the case of the third item there is a lack of definite data applicable to other than a very restricted type of coal-burning equipment.

All of the curves are based on experimental data obtained at the plants of the New York Edison Company and the Union Electric Light & Power Company at Cincinnati. Each of these plants is equipped with an


Refuse per Net Ton, Lb.
800 700 600 500 400 300 200 100 0
Ash in Coal, Per Cent
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5
Curve No. 1.-Capacity ratio
Curve No. 2.-Refuse per net ton of coal
Curve No. 3.-Net tons of coal required
0.72 0.76 0.80 0.84 0.88 0.92 0.96 1.00
Capacity Ratio
6.7 6.5 6.3 6.1 5.9 5.7 5.5 5.3 5.1 4.9 4.7 4.5
Coal per 100,000,000 B.t.u. in Steam, Net Tons

RELATION OF COST FACTORS AND PERCENTAGE OF ASH IN COAL

*Suggestions made at recent convention of American Society for Testing Materials.

underfeed type of stoker, the first being equipped with low-set boilers and the second having a modern type of setting. These curves are the average of the experimental data of the two plants and represent the conditions to be expected in the average underfeed stoker plant.

Two sets of formulas are given for applying these curves to all conditions. The first set takes into account the relative coal cost of a given number of B.t.u. in the steam plus the cost of ash handling and removal, and the second set, in addition to the items considered in the first set, takes into account the cost of extra investment necessary in boiler plants to burn the higher-ash coal.

FORMULAS FOR USE IN CALCULATING COAL VALUES

Three thousand boiler-horsepower maximum rating will produce 100,000,000 B.t.u. in steam per hour. If the boiler plant, including land, buildings, etc., cost $100 per maximum horsepower when using 5 per cent ash coal, then such a plant would cost $300,000, which at 15 per cent (interest 7 per cent, depreciation 6 per cent, taxes and insurance, 2 per cent) equals $45,000 per year, or $5.13 per hour. Let

X = cost in dollars per net ton of 5 per cent ash coal in bunkers (exclusive of ash handling);

Y = value in dollars per net ton of x per cent ash coal in bunkers (exclusive of ash handling);

A = load factor;[1]

B = cost of boiler plant per maximum horsepower divided by 100;

Z = value in dollars per net ton of x per cent ash coal in bunkers;

C = tons of 5 per cent ash coal to produce 100,000,000 B.t.u. in steam (4.67) (curve No. 3);

D = tons of x per cent ash coal to produce 100,000,000 B.t.u. in steam (curve No. 3);

R = capacity ratio[2] (curve No. 1);

S = pounds of refuse per ton from x per cent ash coal (curve No. 2);

T = pounds of refuse per ton from 5 per cent ash coal (160 lb.) (curve No. 2);

U = cost of ash handling and removal in dollars per pound.

Formulas, relative value neglecting investment:

$$Y = CX/D \quad (1)$$

$$Z = Y - (S - T)U \quad (2)$$

[1]Load factor equals total steam generated in pounds per year divided by pounds of steam generated in maximum hours multiplied by 8,760.

Formulas, relative value including investment:

$$Y = \frac{CX + (5.13B/A) - (5.13B/AR)}{D} \quad (3)$$

$$Z = Y - (S - T)U \quad (4)$$

Example 1, where investment cost is not considered: When 5 per cent ash coal costs $3 per net ton in bunkers, and ash handling and removal costs 20 cents per ton, to determine the economic limit of cost for coal having 20 per cent ash:

We have $X = 3$, $C = 4.67$, $D = 6.75$ (curve No. 3), $S = 840$, $T = 160$ (curve No. 2), and $U = 0.0001$.

Substituting in equations 1 and 2,

$$Y = 4.67 \times 3 \div 6.75 = 14.01 \div 6.75 = 2.08$$

$$Z = 2.08 - (840 - 160) \times 0.0001 = 2.01.$$

Example 2, where investment cost is considered: When 5 per cent ash coal costs $3 per ton in the bunkers, ash handling and removal costs 20 cents per ton, the load factor is 50 per cent and additional boiler plant would cost $90 per maximum horsepower with 5 per cent ash coal, to determine the economic limit of cost for 20 per cent ash coal:

We have $X = \$3$, $A = 0.50$, $B = 0.90$, $C = 4.67$, $D = 6.75$ (from curve No. 3), $R = 0.736$ (from curve No. 1), $S = 840$, $T = 160$ (from curve No. 2), $U = 0.0001$.

Substituting in equations 3 and 4,

$$Y = \frac{4.67 \times 3 + \frac{5.13 \times 0.90}{0.50} - \frac{5.13 \times 0.90}{0.50 \times 0.736}}{6.75}$$

$$= \frac{10.71}{6.75} = \$1.59$$

$$Z = 1.59 - [(840 - 160) \times 0.0001] = \$1.52.$$

In building a new plant, careful consideration should always be given to the coal available at the locality where the plant is to be built. Fuel-burning equipment should be installed which would enable the plant in question to deliver desired output for the lowest cost when fixed and operating charges are considered.

Having determined the relative value of the coals under consideration, contracts should be placed with those producers whose prices, quality considered, are the cheapest. In distributing the tonnage, consideration should be given to the general reputation and responsbility of the producer and his facilities for carrying out his contract, also to the advantage of having the coal come from a number of districts so separated that a local interruption to production is not likely to cut off the whole supply.

E. B. RICKETTS,
Ass't to Chief Operating Engr.
New York Edison Company,
New York, N. Y.

[2]Capacity ratio equals maximum capacity of boiler plant with 20 per cent ash coal divided by maximum capacity of boiler plant with 5 per cent ash coal.

Estimated Cost of 20,000-Kw. Plant Addition

Subdivided costs estimated in connection with the addition of a 20,000-kw. turbo-generator and four 1,608-hp. water-tube boilers to an Eastern central station are given in the accompanying table, work now being in progress. The installation includes a two-bay extension of the turbine room and electrical galleries and a four-bay extension of the boiler house, the ends being constructed of hollow tile permitting future extensions to the building. Floors and roof are of concrete on a structural-steel frame, the walls being of brick with steel sash.

Multiple-retort mechanical stokers with steam dumps will be installed, the present forced-draft system being extended to meet the needs of the new boilers. One new forced-draft fan equipment will be installed. Two reinforced-concrete stacks, 230 ft. high above fires and 15 ft. in diameter with brick lining, will be erected. The new generating unit will be of 20,000-kw. maximum rating, delivering three-phase, 60-cycle, 13,200-volt energy.

Circulating-water piping for the condenser of the new unit will be connected into the present intake and discharge water tunnels and water wells. The track runway for the present coal larries over the firing aisle will be extended and provision made for ash hauling conforming to the existing system. Coal-handling equipment will be provided in the yard for stocking and reclaiming fuel and elevating it to the coal bunker. This equipment will include a gantry bridge of 210-ft. span with its reclaiming tower, belt conveyors for

ESTIMATED COST OF CENTRAL STATION EXTENSION

Engineering, including office at works	$149,835
Insurance	8,000
Temporary construction	15,000
Shrinkage on construction equipment	7,000
Station yard	1,700
Building	158,780
Equipment foundations	14,240
Boiler plant	275,500
Draft system	59,800
Feed-water system	8,150
Condenser system	121,350
Piping and covering	100,000
Coal and ash-handling system in building	31,580
Exciters	37,415
Switchboard and wiring	92,655
Auxiliary equipment	11,100
Machine-shop building	20,560
Machine-shop equipment	5,130
Testing and preliminary operation	7,000
Coal-handling equipment and structures	205,265
Light and power for coal-handling plant	10,000
Main generating unit	310,000
Contingencies	49,940
Total	$1,700,000

stocking and reclaiming fuel, with other related equipment. The coal-storage pile will have a capacity of about 42,000 tons.

Switching and control equipment for the new unit and for four additional 13,200-volt feeders will be installed. Reactors will be provided in the main bus and in four 13,200-volt feeders. Two 300-kw., 250-volt exciters will be installed. Five units will be changed over to 250-volt excitation, and a 45-ft. x 65-ft. machine shop built and equipped.

FIELD EDITOR ELECTRICAL WORLD.
Boston, Mass.

Fish versus Mineral Oil for Meters

THE problem of what brand of oil to use in meter bearings has always been an important one. Before taking up the qualities of the various oils, it would be well to outline a few of the desirable characteristics which an oil for electric meters should possess. Some of these are: (1) It should not become acid or deteriorate when exposed to atmosphere at ordinary temperatures. (2) It should stand the action of small quantities of gas such as are found in the atmosphere. (3) It should have sufficient viscosity to keep the oil in bearings such as are found in electric meters. Its viscosity should not change rapidly with changes in temperature. (4) It should not freeze at temperatures down to 15 deg. Fahr. (5) It should have fair lubricating qualities. (6) It should not evaporate.

In order to determine these characteristics, tests have been conducted on fish oils covering a period of six months. The oil as obtained is allowed to remain in contact with metallic lead for about two years, in order to neutralize all the acid after which it is chilled, pressed and bottled. From the results of the tests it was found that the acid content of animal oils could never be entirely eliminated and that the very best that we can hope to accomplish with such oils is to keep the acid content at a certain minimum. As the temperature rises the acid content rapidly increases.

Tests conducted on three most universally used fish oils showed that when hermetically sealed and in contact with clean brass chips none of these oils showed any tendency to decompose, even when exposed to heat and sunlight. However, within eight hours after being in contact with air and brass chips at normal temperature and average humidity, decomposition rapidly set in. Very complex organic acids are formed which attack brass and nickel, forming compounds of nickel and copper. Examined in the light of requirements given above, fish oils do not satisfy the first requirement completely. Physical tests show that the remaining requirements are very well satisfied. It must be remembered also that if they can be used where low temperatures predominate the chemical reactions will be greatly retarded

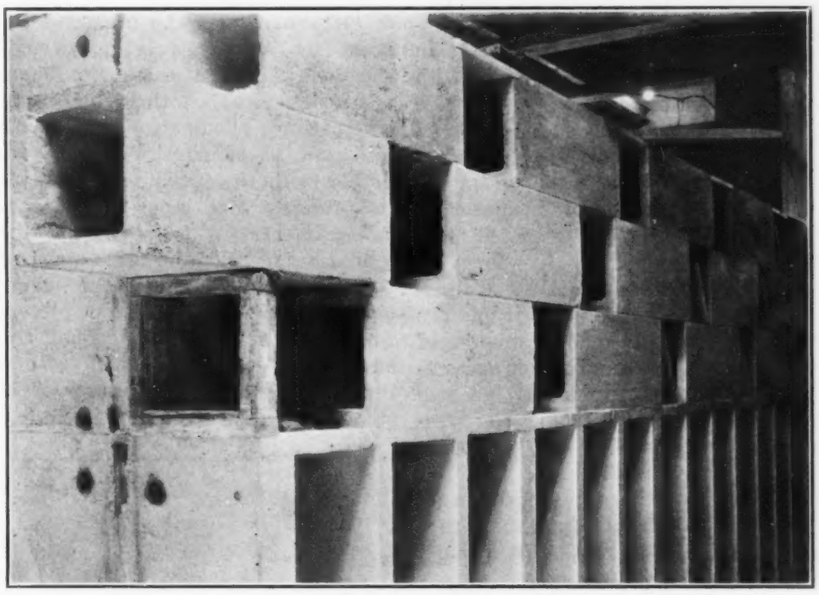
Considering the petroleum-base oils, it was found that they have no acid-forming tendencies. They do not readily evaporate since they are a product of fractional distillation and can be obtained very uniform in quality. It is also possible to obtain oils of this kind that have a viscosity equal to that of fish oils. They have also withstood in their natural state the action of centuries in contact with many chemical elements. Finally, they have very excellent lubricating qualities.

If oils are to be used in places where the temperature is not below zero and where it often rises to 100 deg. Fahr., there can be no argument against a highly refined petroleum oil. However, if the temperatures are extremely low, then there is a field for the fish oil, since there is less tendency to decompose and less change in viscosity with temperature. If fish oils are used it is desirable to use as much as the sapphire cup will comfortably hold. The larger body decomposes much more slowly and its life as a lubricating body is greatly extended.

F. C. HOLTZ,
Chief Engineer.
Sangamo Electric Company,
Springfield, Ill.

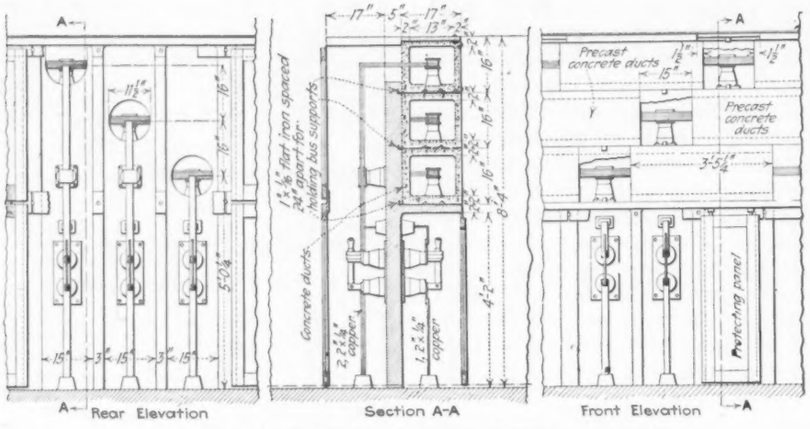
Rigid Bus Structure Made from Pre-cast Ducts

IN THE construction of masonry bus structures the building of the horizontal bus compartments has always been the most difficult part of the work. Where the structures are built of brick, horizontal barriers of Alberene stone or pre-cast concrete are used and the vertical barriers are usually of brick. Where concrete is used for the structure, it is necessary to pre-cast slabs both for the vertical and horizontal barriers or to restort to complicated forming and pouring in slow stages. The cost of construction in either case is high, and it is difficult to build a structure which is sufficiently rigid to withstand the short-circuit stresses met in present-day practice.



PRE-CAST DUCT STRUCTURE WHICH IS VERY RIGID ERECTED AT LOW COST

To overcome these objections the New York & Queens Electric Light & Power Company has adopted a form of bus construction which is illustrated in the accompanying photograph and drawing. Rectangular ducts are pre-cast and erected in three horizontal rows, one above the other, the units being staggered so that the openings for bus taps occur at the proper place in each row. The



THIS DUCT CONSTRUCTION PROVIDES AMPLE CLEARANCE FOR THE BUS INSULATOR SUPPORTS

duct walls are 2 in. thick, and for a 2,300/4,000-volt bus the inside dimensions are 12 in. x 13 in. The length is 3 ft. 5¼ in., which is equal to the width of two single-phase compartments. The units were cast in steel forms and are reinforced with wire mesh, which is open on one side to prevent possible eddy currents. Each unit weighs approximately 400 lb. Inserts are provided on the top of each unit for the insulator on the bus above. It will be noted from the photograph that this form of construction provides additional clearance at the supporting insulators where it is needed on account of clamps and bolts. This is accomplished without increasing the size of the structure, as would be necessary if the increased clearance were carried throughout.

The cost of this type of construction is considerably less than that of others, and it results in a much more rigid structure.

W. C. BLACKWOOD,
Electrical Engineer,
New York & Queens Electric & Power Company,
New York, N. Y.

Pneumatic Equipment for Line Trucks

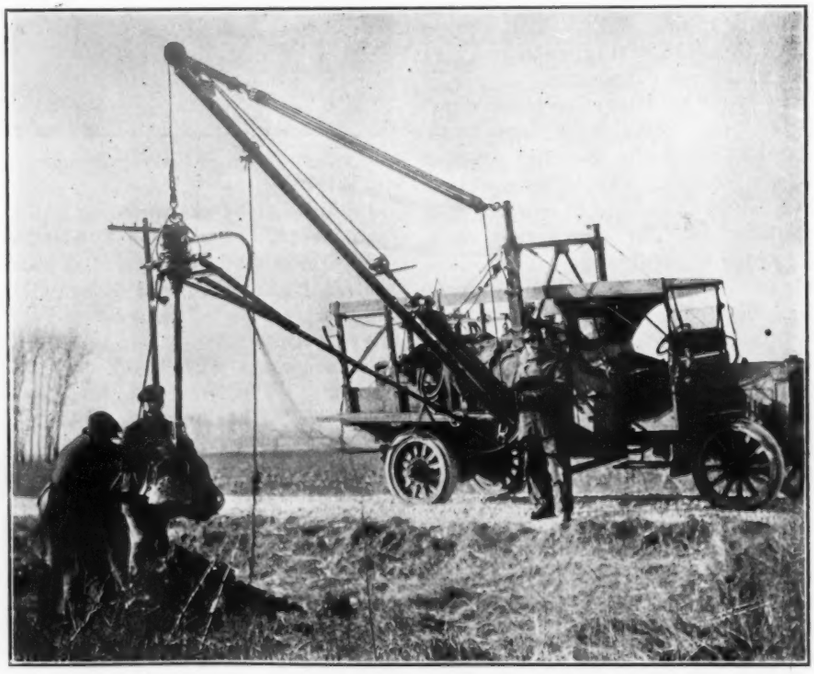
A TRUCK equipped with a derrick, mast and boom, rotary air drill, earth auger with a telescoping stem and a pneumatic cylinder hoist mounted on the boom is shown in the accompanying illustration. This truck has been used successfully by several power companies in their line departments for doing such work as digging pole holes, anchor holes or manholes, lifting poles into place, drilling rock for blasting or for setting anchors, cutting concrete or asphalt pavement, and for rotating and installing pipes horizontally beneath pavement, tracks or walls or other embankments.

The rotary air drill with the auger is suspended from the piston of the hoist by a rope passing over a sheave in the end of the boom. There is also mounted on the truck a reciprocating pneumatic drill with bits and a pneumatic grinder, together with the tackle and adapters for forcing the pipe through an embankment.

In digging holes the truck stays on the hard road and the boom swings over to where the pole is to be placed. The valves are manipulated and the auger guided by a workman. When the auger is filled with earth it is stopped by a turn of the valve. The hoist is then operated, the auger with its material lifted, and when the boom has been turned so that the auger is over the point where the excavated material is to be emptied, the auger is opened. The boom is then moved back so that the auger hangs over the hole, where it is lowered by operating the hoist valves and again rotated until filled with earth. This operation is repeated until the hole is the proper depth. If a boulder is encountered, the boom is moved so that the auger is out of the way and the boulder broken by means of the reciprocating drill. After the hole is dug the pole is lifted into place by the pneumatic hoist. It is necessary, of course, to uncouple the drill and auger from the tackle to do this.

This device with a crew of three men has excavated approximately 1,500 pole holes, under a wide variety of conditions, sometimes drilling six holes 6 ft. deep and 22 in. in diameter in an hour, and then again only twelve a day. In the latter case the digging was through about 2 ft. of stone macadam on top of a stiff blue clay and the holes were 6 ft. 6 in. deep. This was on a transmission line for the Public Service Company of Northern Illinois. In one case where the holes were bored before the poles were distributed sixty 30-ft. poles were set in two hours.

FIELD EDITOR ELECTRICAL WORLD.
Chicago, Ill.



EARTH AUGER DRILL AND BOOM MOUNTED ON TRUCK HASTENS POLE REPLACEMENT AND EXTENSIONS

Central Station Business

Advertising, Selling and Service Methods
Commercial Organization and Management, Customer and Trade Relations, Public and Financial Policies, and Reports of Company Plans and Experiences

Seven Steps in Making a Customer a Shareholder in the Utility

A Condensed Sales Manual for the Guidance of Employee Salesmen in a Customer-Ownership Campaign

AS AN aid to its employees in selling the company's stock to customers the Northern Ohio Traction & Light Company of Akron has analyzed the making of a sale, dividing the process into seven parts in a manner which gives the employee-salesman a clear and logical plan upon which to work. The seven steps are outlined and explained as follows:

1. *To Get Prospects.* — Every friend, acquaintance, person you meet or person mentioned is a possible prospect. Get names and addresses. If he is hard up now, he will be working later, or may know of some one with means.

2. *To Get in Touch with Prospects.*— Prospects are seldom sold on the first or second call. Having received a name or thought of some one who might be a prospect, a cordial letter is a good introduction, to be followed by a visit in a day or so.

Whenever you meet such persons a question such as "What do you think of our savings plan?" "Have you heard about our 7 per cent savings plan?" "There's a bit of property a person doesn't have to pay taxes on," or some such remark will tell how they are going to line up and about when to see them or send a special man.

If favorable, get them to set a time when you can see them to explain the plan in detail. If a prospect is working, pay day is sometimes a good day to see him. It is sometimes desirable to lead up to the subject by talking of some topic in which your prospect may take especial interest.

3. *To Interest Prospects.* — A large part of the world's business is transacted through friends. In order to make friends for yourself, your company or your proposition, you should be friendly by (1) renewal of acquaintance; (2) help or offer to help in the way of information, special service, sale of Liberty bonds, etc.; (3) following up on a service rendered or a special accommodation; (4) suiting your time to that of your prospect in personal calls or telephone calls; (5) getting names and addresses of other friends; (6) investigating complaints and reporting to prospect.

4. *Force of Suggestion.*— (1) Avoid the word "stock"; it puts many prospects on the defensive. Talk savings plan, partnership in our business, customer ownership, earnings kept at home in our own community, etc. (2) Be optimistic. Our business is good, is improving rapidly and so is business in general. (3) Mention your ownership or savings plan on 7.37. (4) Mention others who have invested. (5) Show sample savings plan receipt to illustrate method of making payments, drawing out if necessary, transfer of certificate, etc. (6) The contest idea appeals to many and the idea that you are working for the credit of your department in a contest. (7) Savings plan for children's education, etc., is sometimes effective. (8) Don't forget the tax-free feature.

5. *Closing Prospects.* — Close prospects immediately if possible by getting payment down or a date when payment can be made. Some prospects have been closed by setting a date when the payment should be in to get credit in a contest. It is well to see them a little in advance of the date set to remind them and to be sure no outside salesman gets there as has happened several times by delay.

Several difficult prospects have been closed by offering as a last resort to lend them the first payment. Suggest more shares in closing and pave the way for repeated sales. Assure prospect of your appreciation and offer assistance in your particular department at any time.

6. *Keep Your Own Prospect Lists and Follow Up.* — You may be able to get a sale that no one else can. It is worth trying for. Hundreds of prospects have turned down the specialty man and afterward been sold by an employee. Persistent and repeated effort will win. Records of sales closed on the fifteenth trip are not uncommon.

7. *High Lights for Results.* — Every customer and every child should start a savings plan, 7 per cent, tax free. Liberty bonds exchanged for 7.37, free of charge, free of tax and paying a bonus. A cash business in necessities of life. Investment in home industry in property you can see. Have never missed a dividend. Pay yourself dividends when you pay your electric bill.

If you don't sell your prospect, make a friend for yourself and your company. By so doing you pave the way for future sales and good will.

A Short Form of Meter Contract

IN THE application for service shown in the accompanying cut the Owego (N. Y.) Light & Power Company has eliminated as far as possible all involved, legal phraseology which is found so often in the "meter contracts" used by public utility companies. On the reverse side of this card, which is 3 in. by 5 in., blank space is provided for recording such information as the class of service,

APPLICATION FOR SERVICE

_____ 192

Application is hereby made to THE OWEGO LIGHT & POWER COMPANY for electric service at _____

described on the back hereof, such service to be furnished by said company, and to be used and paid for by the applicant in accordance with the rules, regulations and general schedules of said company on file with the Public Service Commission, and available for inspection in the office of said company, such service to continue until notice in writing is furnished to said company.

_____
Applicant

A BRIEF BUT COMPLETE APPLICATION FOR SERVICE

whether light or power, connected load, the business of occupation of the customer and where he was formerly served.

There are many obvious advantages to the utility in adopting such a form of service application. It makes for a most favorable impression upon the customer as he is not offered a dozen or more paragraphs of fine print setting forth in cold, uninteresting language the rules regulations and penalties which he is liable to incur if he uses the company's service. The customer expects to pay for the energy he uses or he would not ask for it and the company is fully protected by the rulings of the public service commission and by the state laws. Accordingly he is asked simply to sign an application for service, pay for that service as he uses it and to notify the company when he wants it discontinued.

This kind of service contract seems to meet all the legal requirements and it supplies the necessary information for the accounting department to make a record of the customer's account. Such a form of application could be profitably adopted by the utility companies, if not for all customers, at least for those in the residential class, which are in the large majority and, in the last analysis, it is these customers upon whom the utilities must depend for public good will.

Customer Density Shows Popularity of Electric Service

QUINCY, MASS., has the largest number of electric services per 100 population among sixteen leading Massachusetts central stations, according to Henry M. Faxon, president of the Quincy Electric Light & Power Company. At a recent hearing before the Massachusetts Department of Public Utilities Mr. Faxon submitted the accompanying com-

SERVICE DENSITY AND REVENUE PER SERVICE

	Population	No. of Commercial Lighting Services	Average Yearly Receipts per Electric Lighting Service	No. of Services per 100 of Population
Quincy	40,674	8,715	$30.28	21.43
Attleboro	18,840	3,103	35.11	16.79
Beverly	27,079	3,372	50.97	12.45
Cambridge	108,822	9,785	54.82	8.99
Boston	1,165,012	111,326	89.02	9.56
Brockton	102,942	11,950	35.75	11.61
Fall River	133,988	11,361	40.79	8.48
Gloucester	30,506	4,060	37.71	13.31
Haverhill	49,450	6,444	50.47	13.03
Lowell	129,503	9,260	50.89	7.15
Malden	134,014	18,763	32.97	14.00
Northampton	21,652	3,068	38.62	14.17
Pittsfield	50,856	5,737	48.58	11.28
Salem	37,200	6,144	40.96	16.52
Springfield	116,092	21,837	52.50	18.81
Worcester	166,019	31,912	35.69	19.22

parative tabulation, showing the average annual revenue per electric lighting service, the number of services and the population for this group of companies.

The population was recorded as of the 1915 state census for each company. Mr. Faxon did not discuss the local differences in distribution systems among the several companies, but declared that the maintenance of 21.43 services per 100 residents of his company's territory is good evidence that this utility is meeting the requirements of the local public. The comparisons presented illustrate the interest of unit analysis applied to the commercial activities of the modern central station.

A Service Automobile for Appliance Repairs

TO MAINTAIN customer good will and keep appliances in active use John H. Mitchell, new-business manager of the East St. Louis (Ill.) Light & Power Company, re-

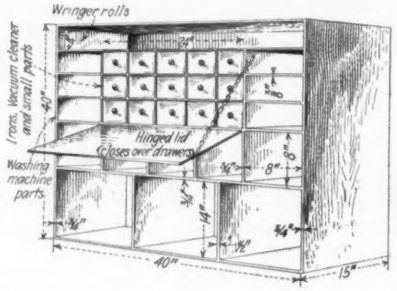


FIG. 1—SERVICE CABINET FOR APPLIANCE REPAIR PARTS

cently placed an appliance service automobile in operation. The car has been especially equipped to carry all the necessary parts in order that most repairs can be made on the customer's premises.

Directly behind the driver's seat a cabinet measuring 40x40x15 in. was built of ¾-in. poplar. This cabinet, Fig. 1, which faced the rear of the car, was divided into compartments, with a center section of twenty drawers for holding small parts such as heating elements, fuses and attachment plugs. This section of drawers was kept in place by a hinged lid, which fastened at the top when closed. The other compartments were designed to contain washing machine parts and spare appliance parts. From the top of the cabinet to the roof of the car

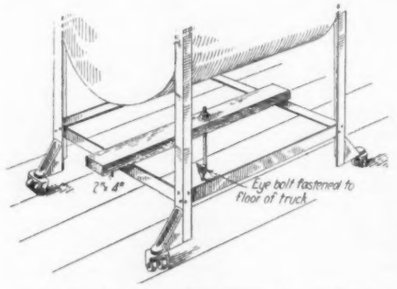


FIG. 2—ADJUSTABLE EYEBOLT HOLDS LARGE APPLIANCES SECURELY

¾-in. iron rods were spaced 4 in. apart in order to prevent unauthorized persons entering the car. The rear doors were closed by means of a padlock.

The remaining space in the car was used for the delivery of washing machines and other appliances. A suitable clamping device shown in Fig. 2 was installed on the bottom of the car which would hold a washing machine securely in position while in transport. Necessary repair parts for appliances on which the guarantee has expired or which were not originally delivered by the company are sold at list price, with an addition of labor charges at $1 per hour of time actually spent on the premises.

What Other Companies Are Doing

Lancaster, Pa.—Plans have been completed by the Lancaster Electrical Contractors' Association and the Edison Electric Company to stage an electrical show this fall during four days, Oct. 18, 19, 20 and 21. It is expected that this will be the largest and most complete show of its kind ever held in a city of similar size in Pennsylvania. A number of contracts have already been closed for exhibit space. H. J. Von Nieda, commercial manager of the Edison Electric Company, is chairman in charge of preliminary arrangements.

Nebraska City, Neb.—The Nebraska City Utilities Company during the week ending June 24 sold merchandise to the amount of $774.87, including four washing machines, five fans, two gas ranges and one two-horsepower motor. Two fifteen-year old boys were hired by the company to sell lamps in Nebraska City at five cents for each lamp sold without regard to size of lamps. In seven days, the boys sold $116 worth of lamps. The lamp sales had been running about $37 a week.

Hartford, Conn.—In the face of severe business depression among the metal-working industries of its territory in 1921, the Hartford Electric Light Company added 3,384 hp. in motors and 393 kw. in industrial electric heating equipment to its system. That is, for every six kilowatts in motor load one kilowatt in industrial heating apparatus went upon the lines. Concentrated attention upon the opportunities for electric heating in diversified industries, combined with sustained engineering interest in performance, have been important factors in the above result. H. W. Derry is power engineer of the Hartford company.

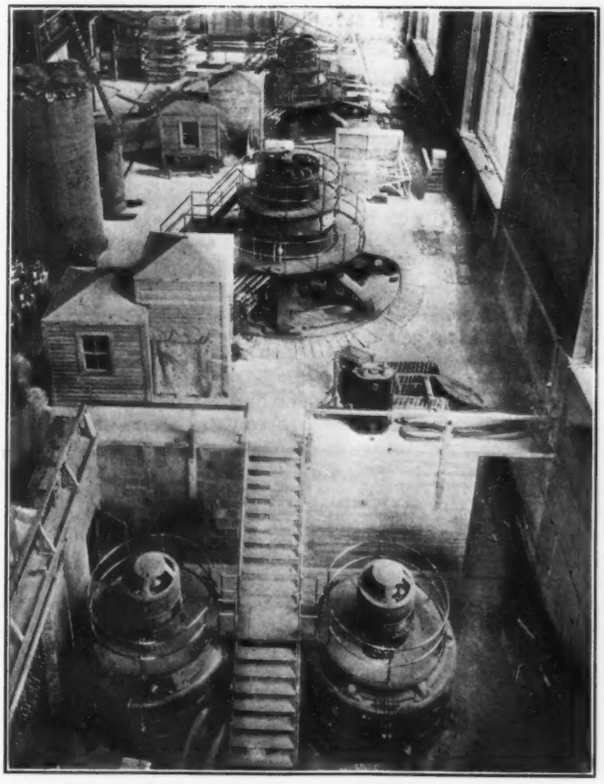
Digest of Electrical Literature

Including Brief Abstracts of and References to
Important Articles Appearing in the Scientific and Engineering Press
from All Parts of the World

Hydro-Electric Development and Steam Equipment

Energy Regulation on Electric Steam Boilers. — E. ZEULMANN. — The constantly rising prices of fuels of all kinds give more and more emphasis to the use of cheap electric power for the generation of steam. The article describes some of the best known types of electric boilers, in which the water itself serves as the electric resistance. Particular attention is paid to the different methods of the regulation of the electric input, discussing their respective advantages and disadvantages. A number of existing plants are described in detail. The paper contains twenty-seven illustrations, most of them sectional drawings. — *Elektrotechnische Zeitschrift*, June 1 and 8, 1922.

Queenston-Chippewa Development of the Hydro-Electric Power Commission of Ontario.—F. A. GABY.—This paper gives a general description which is quite complete of the entire Queenston-Chippewa development on the Canadian side of the Niagara River, which will have an ultimate capacity approximating 650,000 hp. Important features of the waterway are described covering the special design of intake works to avoid ice troubles, the control gate in the canal, the concrete-lined canal channel and consideration given the design of canal, forebay, screen house, penstocks and draft tubes. Of special interest are the 55,000-hp. turbines operating under a head of 305 ft. and connected to 45,000-kva., 12,000-volt, three-phase, 25-cycle, 187.5-r.p.m. generators; the 15 000 kva., 12,000/63,500/76,200-volt transformers, and the design and arrangement of relay systems and of switching equipment to take care of the extremely heavy short-circuit conditions.—*Journal of the A. I. E. E.*, July, 1922.



GENERATOR ROOM OF THE QUEENSTON-CHIPPEWA DEVELOPMENT, SHOWING TOP FRAME OF TWO 45,000-KVA. GENERATORS WITH HOUSE GENERATORS IN FOREGROUND

Generation, Control and Switching

Truck-Mounted Circuit Breakers.—E. K. READ.—A well-illustrated description of the truck-type circuit breakers installed at the Ninety-seventh Street substation of the United Electric Light & Power Company, New York. Breakers placed on the incoming feeders are rated at 600 amp., 25,000 volts, with a rupturing capacity of 26,000 amp. at 13,200 volts, and weigh approximately 4,700 lb. with oil. On the outgoing feeder the breakers installed are rated at 600 amp., 13,200 volts, with a rupturing capacity of 3,500 amp. These weigh approximately 1,980 lb. For the distribution system feeders the breakers are rated at 600 amp., 2,700 volts, with a rupturing capacity of 7,800 amp. The total weight of this truck with oil is approximately 2,000 lb. *Electric Journal*, May, 1922.

Power Systems and the Steel Industry.—E. C. STONE.—The author brings out the most important points which must be observed in the development of high-power generating and transmission systems in the steel industry and shows the means by which these systems are made to deliver a thoroughly reliable supply of power. These means are: Ample factors of safety throughout, adequate emergency equipment properly separated from the running equipment, suitable devices to prevent high voltage and high current, large-capacity circuit breakers selectively controlled by automatic relays, and a complete system of inspection and maintenance. The author considers particularly the question of switchgear and its protection, which he covers very thoroughly.—*Paper presented before Association of Iron and Steel Electrical Engineers*, June, 1922.

Transmission, Substations and Distribution

12,000-*kva. Substation Using Truck-Type Switchboard Throughout.*—A. H. KEHOE.—A very good application of the extensive use of the truck type of switchboard is the West Ninety-seventh Street substation of the United Electric Light & Power Company, New York. In this station are four incoming cables at 13,200 volts, three-phase, 60-cycle. The station transforms the energy for distribution at 2,750 volts, three-phase. This is the first time that this company has used three-phase in its distribution system. The substation is a three-story-and-basement structure. Incoming and outgoing cables, cooling blowers, reactors and miscellaneous station equipment are placed in the basement. The first floor with mezzanine gallery contains six air-blast 2,000-kva. transformers. The 13,200-volt switching equipment, together with the 2,750-volt switches from the transformers and the switchboard for substation service, is placed on this floor. The second floor contains 2,750-volt switch galleries, together with the main and auxiliary 2,750-volt buses. On

the top floor are the operator's desk, the 60-kva 10 per cent air-blast induction regulators and the control board for all oil switches.—*Electric Journal.* May, 1922.

Units, Measurements and Instruments

Testing Transformer Rated at 350,000 Volts.—R. MASSOT and P. BUNET.—A 300-kva. oil-insulated testing transformer is described with one of the ends of the 350-kv. winding permanently grounded. A series-parallel arrangement of the 5,000-volt low-voltage winding gives one-quarter, one-half or the full voltage. An oil-filled condenser bushing is used to carry the insulated end of the winding through the cast-iron cover, and its oil content acts at the same time as an oil conservator. The winding is of the circular-disk design and is placed in one stack on a three-legged iron core. The transformer weighs complete with oil 15 metric tons and has an over-all height of 4.65 m. Tests with this machine at full rated voltage gave a silent operation without visible corona discharges.—*Revue Générale de l'Electricité,* May 20, 1922.

Illumination

Value of Improved Street Lighting to Municipalities and Property Owners.—C. H. SHEPHARD.—There are so many considerations involved in the selection, construction, operation, maintenance and financing of a street-lighting system that are complicated and interrelated that it is almost impossible to lay down any definite rules except in the most general form. However, the municipalities contemplating the installation of a street-lighting system should first obtain a comprehensive engineering analysis of all the factors involved. This analysis covers the intensity of illumination desired and unit or units proposed to give such illumination, the type of standard required to support the unit, type of electrical system necessary to supply power most economically, specifications covering labor and material, and estimate of cost of construction, operation and maintenance, with a method of financing.—*Electrical Journal,* May, 1922.

Motors and Control

The Application of Electricity in the Manufacturing Industry.—The first of a series of articles that will deal with the varied uses of electricity in different industries. This article applies to the manufacture of rubber tires. The Goodyear Tire & Rubber Company is taken as an example.—*Electrical News,* June 1, 1922.

Motor-Service Panels with Standardized Equipment.—C. H. MATTHEWS.—Details are outlined of the methods used in building switchboard panels with interchangeable equipment that facilitate quick changes, new requirements and repairs. Drawings and photographs show various panels for 2,200-volt motors, including lines and feeder circuits. For each panel there is an assembly drawing and a wiring diagram. A master list of material is made up, including all of the parts used on all of the standard types of panels adopted. This list describes each part in detail, and to each item listed has been given a designated letter. Then for each panel a table is made giving the number of each one of the parts required for a particular job. Five types of panels described in the article are for an incoming line, a slip-ring motor, a feeder circuit, a synchronous motor and a squirrel-cage motor respectively.—*Electrical Review and Industrial Engineer,* June, 1922.

Heat Applications and Material Handling

Electric Ovens for Baking or Heat Treating.—WIRT S. SCOTT.—The author points out the many advantages of electric ovens and discusses the cost of electric heat compared with gas and oil fuels. He explains the flexibility and ease of heat control, the freedom from gases and the low maintenance, and shows why automatic conveyors for dipping parts in enamel and for carrying them through ovens are particularly effective with electric heating. He points out six advantages of electric ovens, namely, (1) reduction in amount of rejected work and the necessity of refinishing parts; (2) improved quality of products due to definite temperature control; (3) reduced fire risks; (4) economy of continuous-conveyor-type oven made possible by the use of electric heaters; (5) greater speed of production; (6) low production costs. The article is well illustrated and contains tables comparing energy cost of gas and electric ovens and energy required by electric furnaces to raise the temperature of a cold furnace and to hold it at a definite temperature.—*Electrical Review and Industrial Engineer,* June, 1922.

Electrophysics, Electrochemistry and Batteries

Electricity and Matter. — ERNEST RUTHERFORD.—A résumé is given of the great advances made in recent years in knowledge of the relations between electricity and matter. This leads to a consideration of the fundamental problem of physics, the constitution of the atoms of the elements.—*Electrician,* June 23, 1922.

Electrical Engineering Features of the Electrical Precipitation Process.—G. H. HORNE.—The handicaps first met with in the Cottrell process and the means by which these were overcome are reviewed. The source of power, methods of rectification, relation between precipitation and impressed voltage and power consumption are discussed. It is shown that Peek's formulas for corona loss may be used as a means of interpreting electrical precipitation power date.—*Journal of the A. I. E. E.,* July, 1922.

Maintaining Batteries on the Long Island Railroad.—Complete facilities are provided at the Morris Park shops for overhauling batteries. The yard is wired with convenient outlets for charging batteries without removing them from cars. A description is given of the assembling and charging department, separating room, method of washing battery boxes and elements, means of testing car-lighting generators and other car-lighting equipment, as well as of the distilled water plant.—*Electric Railway Journal,* June 17, 1922.

Traction

How Resistance is Used in Railway Automatic Substations. — Views of several electrical engineers of long experience with automatic substations are presented on the question of using resistance in the machine circuits or in the feeder circuits, or both. The discussion covers city and suburban and interurban substations and complete automatic substations.—*Electric Railway Journal,* June 24, 1922.

Electrification of the Chichibu Railway of Japan.—CORLISS A. BERCAW.—Extensive hydro-electric power development has made possible the electrification of the Chichibu Railway, with resulting increase in capacity and conservation of fuel resources. Passenger and express service will be accommodated by multiple-unit cars, while mixed freight and passenger trains will be operated by five 41-ton electric locomotives.—*Railway Review,* June, 1922.

Telegraphy, Telephony, Radio and Signals

Construction and Operation of a Simple Home-Made Radio-Receiving Outfit.—The method of constructing a very simple and inexpensive receiving outfit (600 m. to 200 m.) from materials which can be easily obtained is described. The cost of the materials need not exceed $10. Satisfactory results have been obtained from sets constructed according to these instructions by persons having no previous experience with radio. The equipment uses a crystal detector.—*Circular No. 120 of the Bureau of Standards.*

The Field Radiated from Two Horizontal Coils.—GREGORY BREIT.—The landing of airplanes can be facilitated by emitting from the landing field a vertical beam of electromagnetic radiation of a radio frequency. A type of transmitting-coil antenna has been devised for this purpose the behavior of which is calculated, and formulas are worked out for the current received in a coil aërial and in an antenna oriented in a known manner at a sufficient distace from the transmitter.—*Scientific Paper No. 431 of the Bureau of Standards.*

Printing Telegraph. — S. SUZUKI. — Various kinds of machine printers are described and compared from the standpoint of line economy. Among these are the Western Electric multiplex printer, "Star Stop" printer, Kleinschmidt printer and "teletype."—*Journal of the Institute of Electrical Engineers of Japan,* May, 1922.

News of the Industry

Chronicle of Important Events and General Activities, Announcements and Reports of Association Meetings, Court Decisions and Commission Rulings and News of Electrical Men

Frank W. Frueauff Dies

Junior Member of H. L. Doherty & Company Carried Off by Sudden Illness

FRANK W. FRUEAUFF, junior member of the firm of Henry L. Doherty & Company, vice-president of the Cities Service Company and an outstanding figure in electric light and power circles, died suddenly on Monday afternoon, July 31, at his home in Fifth Avenue, New York City, from an attack of acute indigestion. He had attended conferences at his office in the morning, although suffering severely, and had made an engagement for the evening. He was only forty-eight years of age. Plans for the burial had not been completed when the *Electrical World* closed its forms.

Mr. Frueauff was born on March 29, 1874, in Columbia, Pa. He moved with his parents to Leadville, Col., in 1881 and to Denver in 1887, and as a boy sold newspapers in the latter city. He was graduated from high school in 1891 and entered the employ of the Denver Consolidated Electric Company, remaining with it until Henry L. Doherty in 1899 brought about its consolidation with the Denver Consolidated Gas Company as the Denver Gas & Electric Light Company. Beginning as a meter reader, Mr. Frueauff rose rapidly in these companies, becoming secretary of the last-named in 1899, vice-president and general manager in 1907 and president in 1913.

Mr. Doherty preceded Mr. Frueauff as the president of the Denver Gas & Electric Light Company, and in 1905 the two men formed a partnership as Henry L. Doherty & Company, Mr. Doherty contributing engineering and mechanical genius, and Mr. Frueauff extraordinary skill in the promotion of friendly public relations. At the subsequently established New York headquarters of the company, which rapidly became among the foremost controllers of public utilities in the country, Mr. Frueauff acquired the reputation of being one of the busiest executives in America, becoming a director in 141 corporations and the head of all the Doherty interests, directing the affairs of public utility companies in all parts of the country, serving more than two hundred communities. The Cities Service Company, a Doherty holding corporation, increased its business under Mr. Frueauff's guidance in a few years from a million dollars a year to one hundred million or more. Despite the tremendous load of work which he shouldered, his associates have always described him as a just and cool man who under no circumstances would let the most trying situation turn him from an even, careful consideration of facts. He was a pioneer in the promotion of the sale of securities to customers, and to this policy he attributed no small part of his success.

Mr. Frueauff was elected president of the National Electric Light Association for 1909-1910. He had also been president of the National Commercial Gas Association and the Colorado Light, Power and Railway Association. He was an associate member of the American Institute of Electrical Engineers and a member of the Illuminating Engineering Society. He was married in March, 1909, to Miss Antoinette Perry of Denver, who, with two daughters, survives him.

F. W. FRUEAUFF

Philadelphia Plans Engineering Congress for 1926

Preliminary steps have been taken to organize an international engineering congress to be held in Philadelphia in 1926 in connection with the sesquicentennial celebration of the signing of the Declaration of Independence. The four major national engineering societies—civil, mechanical, electrical, and mining and metallurgical—are to participate with the Engineers' Club of Philadelphia in making the plans, which provides for a board of management consisting of two representatives of each of the five organizations mentioned and two from the Federated American Engineering Societies.

Rail Strike Affects Utilities

Fuel Situation of Electric Light and Power Companies Still Causes No Alarm

ALTHOUGH officials in Washington are being deluged with requests for coal, most of which are being returned promptly to the governments of the respective states from which they came, the fuel situation as it affects the electric public utilities is not serious. Thus far only two urgent cases have come before the National Electric Light Association, and steps have been taken to relieve the companies involved. When it is recalled that almost 40 per cent of the electrical output in the country is generated by water power and that coal-burning electric public utilities in large cities have ample supplies of coal on hand which are being constantly added to, the complacency with which the privately owned public utilities look upon the fuel crisis is explained. Right now complaint has been lodged in Washington against seizure of coal en route to a public utility in Michigan by an Ohio steel company.

The rail strike has also affected construction work on a large hydro-electric plant in Alabama. Because of car shortage this public utility is unable to obtain supplies of cement with which to carry on its construction work. Solicitude is being expressed by a few large electric public utilities operating in the Eastern Provinces of Canada about their coal supply. These companies operate hydro-electric plants and steam stations. Until American industries are supplied it is questionable whether a large amount of coal will be shipped across the border. The indications are that fuel will have to be rationed until next spring. Coal production is increasing gradually, and belief is expressed in Washington that if this product is properly allocated no great hardship will result even though the coal strike continue for some time. Every effort is being made to settle the railroad strike first.

State Fuel Agencies Opened

Henry B. Spencer, the fuel distributor of the government, has opened offices in Washington and made appointments of state fuel agencies in Alabama, Connecticut, Florida, Illinois, Indiana, Iowa, Kansas, Kentucky, Massachusetts, Michigan, Nebraska, New York, North Carolina, North Dakota, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont,

Virginia, West Virginia and Wisconsin. In most of the states the public utility commissions are acting as the state fuel agency. The price of coal, despite the government mandate, is constantly increasing, some utilities paying as high as $10 a ton, an increase of approximately 90 per cent over contract price. These utilities, however, are determined to maintain service and are buying coal whenever and wherever it is procurable.

South Carolina Property Sold at Auction

George B. Tripp, receiver for the South Carolina Light, Power & Railways Company, on Monday sold at auction, under an order of the United States District Court, all the property of the company, including the street railways, the hydro-electric plant and the gas and steam-electric plants. The property was bought in by the reorganization committee for $1,000,000, there being but one bid. Plans for the reorganization of the company have been completed, and the properties sold will soon be taken over by the South Carolina Gas & Electric Company, which will make extensive improvements to the plants. It is understood that Mr. Tripp will be the president of the new company.

Safety Congress to Listen to Utility Engineers

A number of prominent central-station executives and engineers are scheduled to take part in the eleventh annual safety congress of the National Safety Council, which will be held at the Cass Technical High School, Detroit, on Aug. 28 to Sept. 1. Joint meetings of the public utilities and electric railway sections will be held on Aug. 29 and Aug. 31. "Progress in Accident Prevention in Public Utilities" will be the subject of an address by C. E. Morrison, vice-president and general manager Utilities Mutual Insurance Company; "The Financial Side of Accident Prevention" will be presented by Garrett Seeley, vice-president and general manager Pennsylvania-Ohio Electric Company; "The Human Side of Our Business" will be the topic of B. I. Budd, president Chicago Elevated Railways, and H. J. Warnick, engineer Northern Indiana Gas & Electric Company, will deal with "Co-ordination Between Engineering and Operating from the Standpoint of Safety." Prepared discussions will follow these addresses.

On Wednesday, Aug. 30, J. H. Eustace, chief operating engineer People's Gas Light & Coke Company, Chicago, will speak on "The Relation of the Engineer to Accident Prevention," with a discussion by Charles B. Scott of Chicago and J. B. Douglas of Philadelphia. Homer E. Niesz will be toastmaster at a luncheon, when speeches will be made by Arthur W. Brady, president Indiana Union Traction Company, and Alex Dow, president Detroit Edison Company.

New 110,000-Volt Link in Massachusetts

Turners Falls and Pittsfield Companies' Lines Will Be Joined by Steel-Tower Line

PLANS are completed for the interconnection of the systems of the Turners Falls Power & Electric Company and the Pittsfield Electric Company in Massachusetts through the construction of a 110,000-volt double-circuit, steel-tower line from Turners Falls across Greenfield and the Berkshire Hills country, tying together the plants of the Connecticut and Housatonic valleys for economical operation. Construction work has begun under the direction of H. D. Seavey, superintendent of distribution of the Turners Falls company, the rights-of-way having been nearly all obtained, including necessary rights for crossing Greenfield and entering Pittsfield.

The tower line will be of the same heavy construction used on the other transmission lines of the company built under Mr. Seavey's direction, all of which passed through New England's great sleet storm of November, 1921, without the failure or distortion of a single tower. The line will be operated at the start at 66,000 volts, but the switching and transforming equipment installed at each end and the design and insulation of the towers will be suitable for 110,000-volt operation at any time on short notice and without appreciable additional investment.

A special feature of the line is that the towers from the Cabot Station, in Turners Falls, to Greenfield will be arranged to carry two 15,000-volt circuits for supplying Greenfield, and the towers at the Pittsfield end will be arranged to carry two 20,000-volt lines to be utilized by the Pittsfield Electric Company in its general distribution system throughout the Housatonic Valley.

The Pittsfield Electric Company now supplies energy to most of the other distributing companies and industries in the upper Housatonic Valley, and the construction of this line marks the first entrance of modern high-tension transmission facilities into that district. The design and construction of the line will be such as amply to meet the needs of this district, with plenty of spare capacity for many years.

Mississippi Removes Taxes from Utilities

A measure recently passed by the State Legislature of Mississippi provides five years' exemption from ad valorem taxation for all public utilities and many industries. The bill exempts from taxation the tangible property but not the products of railroads, textile mills, industrial and agricultural machinery industries, clothing, shoe, furniture and woodworking plants, building-material establishments, paper products, dairying companies, canneries, leather-tanning plants and all public utilities. It specifies as tax-exempt all factories of whatever nature run exclusively by water power, all conduit and pipe lines, pumping plants, natural and manufactured gas appliances, manufacturing and distribution of equipment, hydro-electric plants and steam-driven and oil-burning electric stations and ice factories.

Sponsors of the measure expect large industries to establish branch plants in Mississippi. By exempting water-power-driven plants they expect to promote rapid development.

McKinley Values Muscle Shoals at $100,000,000 a Year

Asserting that the Muscle Shoals power project would bring $100,000,000 a year into the United States Treasury if it were possible to sell the potential energy it can yield at Washington prices, Senator McKinley of Illinois, who is president of the Illinois Traction Company, has had inserted in the *Congressional Record* a prepared argument in which he declares that Henry Ford ought to "come in under existing laws which control rates for power."

"Mr. Ford proposes to buy from the government for $5,000,000," said Senator McKinley, "what has cost the government $150,000,000 and pay 4 per cent interest on the additional $40,000,000 or $50,000,000 which the government must invest to complete the dam, and in addition to that he proposes to pay the government $46,000 a year, which he calls amortizement, and $55,000 a year, which he calls repairs.

"Mr. Ford does not propose to take this property, but to have a ten-million-dollar corporation take title to it, and this title stands for 100 years. Experience with all large capital investments as corporations is that sooner or later, within ten or twenty years, they pass into control of large money holders commonly known as 'Wall Street.'"

Power Commission's Policy on Navigable Water Liberal

That the Federal Power Commission intends to maintain a liberal policy in allowing the obstruction of streams for power purposes when it is evident that the value of the stream for navigation is insignificant as compared with its potentialities as a power producer is indicated by the commission's recent action on certain typical declarations of intention affecting respectively the Saco River in Maine, the Menominee River, which forms part of the boundary between Wisconsin and Michigan, and the Connecticut River in the vicinity of Monroe, N. H. In each of these three instances the commission found, after investigation, that the river named is not as regards its character in the particular vicinity affected "navigable waters" as defined in the water-power act and that the construction proposed would not affect the interests of interstate or foreign commerce.

Death of Alexander Graham Bell

Inventor of Telephone Passes Away in His Seventy-sixth Year—For Almost Fifty Years He Had Ranked Among the Most Famous of Practical Scientists

THE death of Alexander Graham Bell at his summer home near Baddeck, Nova Scotia, took place on Wednesday last, Aug. 2. Dr. Bell had been in failing health for some time, but had not been confined to bed and the fatal termination of his illness was unexpected.

Alexander Graham Bell was born in Edinburgh, Scotland, in 1847. In 1870 he emigrated to Canada, and in 1872 he went to Boston, Mass., to teach deaf mutes—an object in which he displayed lifelong interest—afterward taking the chair of vocal physiology at Boston University. It was while living in that city that he invented the telephone—an achievement that has placed him among the most famous inventors of all ages. June 2, 1875, is recorded as the date of the birth of the telephone, and 109 Court Street, Boston, as the place. This was the location of the electrical workshop of Charles Williams, where Thomas A. Watson made for Bell the crude instruments of the "harmonic telegraph" used by the professor in his class work. It was while testing these instruments that the accident occurred which led Bell to discover that the vibration of a steel reed over an electromagnet created electrical impulses which when received on an instrument on the other end of the wire caused a perceptible vibration and a musical tone. The speaking telephone thus came into being, and the harmonic telegraph was forgotten. The first connected speech was transmitted from Bell to Watson on March 10, 1876, and passed from the former's bedroom to his laboratory at 5 Exeter Place, Boston.

A patent for the new invention was granted in 1876, and in the same year successful tests were made between Brantford and Paris, Ontario; Boston and Cambridge, Mass.; Boston and Salem, Mass., and at the Centennial Exposition in Philadelphia. The story of how the Western Union Telegraph Company refused to buy the patents for $100,000, and how, under the leadership of the late Theodore N. Vail, the American Bell Telephone Company developed the instrument until it became the business and household necessity that it is today and the most widely used of all electrical devices, is a familiar one and need not be repeated.

Dr. Bell had been the recipient of many honors from governments and learned bodies, including the decoration of the Legion of Honor from France, the Albert medal of the Society of Arts of London, the gold medal of the Royal Society of England, the Elliott Cresson medal of the Franklin Institute and the Edison medal of the American Institute of Electrical Engineers. The French Academy gave him the Volta prize of 50,000 francs, and American and foreign universities conferred numerous honorary degrees upon him. He was a prominent figure in the field of aërodromics and aërodynamics and is said to have spent

ALEXANDER GRAHAM BELL

fifteen years and more than $200,000 in testing his tetrahedral kite, which he originally believed would be the basis of aviation. He had several inventions in other fields to his credit and had built himself a hydroplane capable of making 70 miles an hour.

In recent years Dr. Bell had lived at Washington, D. C., spending, however, much time in travel and having a summer home and a laboratory in Nova Scotia.

Coming Activity in Indiana Involves Cost of $35,000,000

Two steps of much importance have been taken recently by the Indiana Public Service Commission in connection with plans of electric and interurban utilities to expend more than $35,000,000 in Indiana during the next twenty-four months for extension of electric service. The developments were:

1. The Indiana Electric Corporation was authorized to issue $7,000,000 in securities for the construction of a superpower plant near Terre Haute.

2. The commission began consideration of a petition of the Terre Haute, Indianapolis & Eastern Traction Company for a certificate of convenience and necessity for certain transmission lines in Indianapolis, which is the first step toward the expenditure of approximately $7,000,000 for improvement of the East Tenth Street power plant of the company at Indianapolis.

With these two projects under way, the commission has approved or received reports concerning other approximate expenditures on electrical development in Indiana as follows: Indiana Hydro-Electric Power Company, power plant at Monticello, $5,000,000; Indiana-Michigan Electric Company, extensions at South Bend and in St. Joseph County, $1,000,000; Interstate Public Service Company, improvements at various plants, $2,000,000; Calumet Electric Company, electrical developments in Lake County, $10,000,000.

All of the capital to be invested in the electrical enterprises, it is understood, will come from outside Indiana. Capitalists have been induced to invest these large sums in that state, officials of the companies say, because of the co-operation of the Public Service Commission in developing the electrical industry of Indiana.

The order in the Indiana Electric Corporation case authorizes the company to issue $4,500,000 in 6 per cent first mortgage bonds, $1,500,000 in 7 per cent preferred stock and $1,000,000 in common stock. The property of the company at the power-plant site will be worth from $6,000,000 to $6,500,000, the order of the commission says.

The Indiana Electric Corporation, which was authorized to merge seven large electric utilities of the state, will include the Merchants' Heat & Light Company of Indianapolis. An action to quash an injunction issued against the merger at the instance of the cities of Indianapolis and Kokomo is to be heard in the State Supreme Court in October. Plans of the corporation call for the immediate construction of a power plant with two 20,000-kw. turbo generators. The site, which is near Terre Haute on the Wabash River, was located in the heart of the coal fields so as to provide cheap fuel. Approximately 3,000 acres of coal lands are to be purchased by the company. Power generated at the plant will be sent to Indianapolis over transmission lines from the power plant, a distance of approximately 100 miles, for use by the Merchants' Heat & Light Company.

Illinois Utility to Increase Capacity

The Public Service Company of Northern Illinois has awarded contracts for the first turbine unit of the new plant at Waukegan, Ill. This contract includes a 20,000-kw. turbine, a condenser and three 1,409-hp. boilers. Eventually the station will contain about 250,000 kw., using eight units. Preliminary plans have been completed, and work will be started about Sept. 1 so as to finish the installation of the first unit by Aug. 1, 1923. This plant is located north of the present location, and a tract of eighty acres has been procured near the lake to afford an ample supply of condensing water.

This station will eventually fit into the interconnected group of plants now ranging from the Indiana state line through the Edison properties in Chicago northward to Waukegan.

Water-Power Applications Total 20,000,000 Hp.

Five applications for permits or licenses under the federal water-power act were filed with the Federal Power Commission during the week ended July 22, making a total of three hundred and twenty-nine applications received since the creation of the commission. These projects involve approximately 20,000,000 hp., or more than twice the existing water-power installation of the country. This fact is brought out in a report issued by the commission and covering its two years of administration under the water-power act. In the last year, after the first flood of applications had come in, they aggregated 6,000,000 hp.

Up to June 30 last, the report says, the commission had authorized a total of sixty preliminary or survey permits and forty-nine licenses, the permits involving an estimated installation of 2,386,000 hp. and the licenses for power projects 1,932,000 hp.

Texas Plant to Burn Lignite

It is authoritatively stated that if the negotiations of the Texas Power & Light Company of Dallas for the lease of the municipal light and power system of Austin fall through, that company will build a large electric power station at Bastrop, 35 miles southeast of Austin, and will extend its trunk transmission line to that place from Taylor. The proposed plant at Bastrop will be in the center of the lignite coal field which will afford cheap fuel, it is explained. W. B. Head, chairman of the board of directors of the Texas Power & Light Company, and engineers representing the company have been making an investigation of the situation at Bastrop with the view of building a power station there. If the municipal light and power system at Austin is leased, the company will build a power station to cost approximately $2,000,000 it is stated.

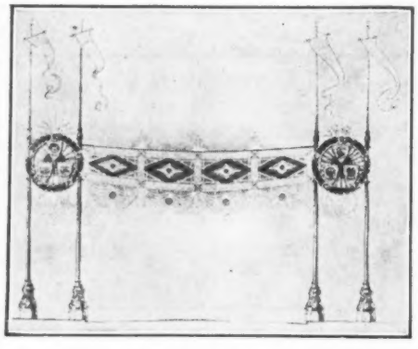
Electrical Leagues to Meet at Association Island

Plans are developing rapidly looking toward the gathering of representatives of all the local electrical leagues of the country in conference for several days in the first week of September at Association Island, Henderson Harbor, N. Y. A call was sent out recently by the Society for Electrical Development suggesting such a meeting for the purpose of affording a closer contact between local leagues in the work which they must carry out if the industry-wide movement for business development is to progress. The Joint Committee for Business Development is also supporting the move and working in close harmony with the society.

It is believed that it will greatly facilitate the organization of similar leagues in other cities, where they must be established to carry out the co-operative work of the campaign, if the past and present methods, activities and experience of existing leagues can be put on record before the industry and a working harmony established. Association Island has been suggested as the meeting place, because it is felt that the traditions of "the island" as the birthplace of organized co-operation in the electrical industry will lend a stimulating background for this meeting and that the friendly atmosphere of the informal meetings and personal contacts which the island affords will assist in welding the unity of interests. Arrangements have been made for keeping "Camp Clavarack" open for one week after the usual season.

Rocky Mountain Exposition Has Large Aims

According to the promoters of the Rocky Mountain Electrical Exposition, which, as already announced in the *Electrical World*, is to be held at Salt Lake City on Oct. 2 to 14, something more important than a temporary stimulus of business is aimed at. The larger purpose of the show is "permanently to widen the scope of the electrical market by bringing into logical contact and working relation the manufacturer, the central station, the jobber and the contractor-dealer," and to pave the way for a vast expansion of electric service to the public.



DESIGN FOR ARCHWAY OF JEWELS

The exposition, it is asserted, will be by far the best ever held beyond the Rockies, and reservations of space already made show that manufacturing companies from every part of the country will be represented. An attendance of 200,000 is thought a reasonably conservative estimate, in view of the fact that the Utah State Fair and the semi-annual conference of the Latter Day Saints will be held at the same time. The Rocky Mountain Electrical Co-operative League is carrying on an active advertising campaign in the interest of the exposition.

A brilliant illumination feature in the form of a 55-ft. "regional arch" has been designed by W. D'A Ryan especially for this exposition. At the end of the arch will be a circular emblem, 12-ft. in diameter, bearing the coats-of-arms of the six states of the Rocky Mountain group—Utah, Nevada, Colorado, Montana, Idaho and Wyoming.

National "Electrical Home" for Atlantic City

The first "electrical home" of national scope is to be opened on the Million-Dollar Pier at Atlantic City on Aug. 10, the exhibit to continue to Sept. 15. The "home" is now under construction, and every effort is being made to have it represent the last word in domestic electrical equipment. It is a representative house of the bungalow type, costing approximately $15,000, and particular attention is being given to harmonizing the electrical fixtures with the interior decoration and furnishings. It is planned to make this a genuine home, not a warehouse or a mere display of electrical devices, and only one of every type of article will be displayed.

Representatives of the electrical manufacturers and men speaking for mahogany, wallpaper, and various building trades met in New York last week, with A. Conrad Ekholm of the Million-Dollar Pier management for a final discussion of the equipment of the bungalow. Arrangements were also made for the proper demonstration of the electrical equipment.

Being opened in Atlantic City at the height of the season, this "electrical home" offers an unusual opportunity to reach people from every part of the country. During the last week, from Sept. 8 to 15, the Atlantic City Building Exposition and Fall Fashion Show will be held on the Million-Dollar Pier, and in addition Atlantic City's annual pageant is set for Sept. 6 to 8. It is estimated that no fewer than half a million people will visit Atlantic City in that week alone and that at some time during their stay they will inspect the home electric. Extensive plans have been made for publicity and advertising of this home, which has already aroused widespread interest in electrical circles.

Brilliant Lighting Planned for Brazil's Exposition

The spectacular lighting displays of the Panama-Pacific International Exposition of 1915 are to be rivaled at the Centennial Exposition commemorating a hundred years of Brazilian Independence to be held in Rio de Janeiro this fall. W. D'A. Ryan, who designed the displays for the California celebration, will supervise the lighting at the Brazilian exhibition, and the illumination will cost about $500,000.

The energy both for power and light will be supplied by the Rio de Janeiro Tramway, Light & Power Company. This company also has the contract to furnish and install all sub-stations, transformers and high-tension feeders within the grounds. It is estimated that the connected load will be approximately 3,000 kw., the night load about 2,000 kw., with a peak of 2,500 kw.

The main grounds and buildings will be flooded with light from masked cartouche and banner standards, supple-

mented by ornamental luminaires, mostly of the so-called lantern type. The relief lighting in the towers, minarets and windows will be rose-red and orange to give depth, texture and atmosphere. The floral effects for the most part will be in masses of solid color which will be brilliantly featured in illumination. Flags and special features will be lighted by incandescent searchlamps so as to stand out strongly against the blue-black background of the sky. The entire composition will be dominated by a scintillator in ever-changing colors. The roof and dome of the Palace of States, the largest building of the exposition, from which a domed tower rises to a height of 200 ft., will be treated with 40,000 "Novagem" jewels.

In addition to the main exposition buildings, Ihla de Fiscal, a small rock island situated in a crescent of the bay and almost entirely covered by a quaint building of German Gothic architecture, will be bathed in soft colors. It will be flanked by palm trees, which at night will stand out in scarlet against the darkness and will harmonize in effect with the banner standards, light from the windows and colored relief lighting on the structure. From the tower there will be an aurora of seven searchlight beams. While this island is approximately half a mile from the north entrance of the exposition, the colors will be reflected in the water, adding greatly to the general effect and beauty of the electrical display.

Standards Committee Adopts N. E. L. A. Meter Code

The American Engineering Standards Committee has adopted as a national standard the meter code of the National Electric Light Association. This code originated very largely with the Association of Edison Illuminating Companies, and this action of the A. E. S. C. stamps it as the best.

Electric Utility Financing in July Unsensational

ELECTRIC light and power public utility financing, which showed a slight tendency to decline in amount in June, continued on the down grade during the month of July. The total amount of stocks and bonds of this type offered investors was $51,886,100. This figure, however, does not compare unfavorably with the utility financing of July, 1921, when the volume of investments offered equaled $50,697,315. The twenty offerings listed below yielded the investor on an average 6.61 per cent. The largest single offering was the seven-and-one-half-million-dollar issue of gold bonds of the Central Indiana Power Company.

Since the beginning of the year electric utility investments have aggregated $365,890,140 and yielded a rate of return averaging 6.55 per cent. This figure, representing an increase of more than $100,000,000 over the corresponding period last year, is proof of the great activity now existing in utility financing.

Name of Company	Amount of Issue	Period	Class of Security	Purpose of Issue	Rate of Interest	Offered at	Per Cent Yield
Los Angeles Gas & Electric Corp.	$5,000,000	Twenty-five-year	General and refunding mortgage gold bonds, series E	To provide funds for additions	5½	96½	6
Texas Power & Light Co.	2,000,000	One-hundred-yr.	Gold debenture bonds, series A	To provide funds for retirement of all general mortgage 8 per cent gold bonds and other purposes	6	90½	6.60
Cumberland County Power & Light Co. (Me.)	900,000	Twenty-year	First and refunding mortgage gold bonds	To reimburse company for construction of new plant at Portland	5	89½	5.87
Northern States Power Co. (Minn.)	2,000,000	Nineteen-year	First and refunding mortgage gold bonds	To provide funds for extensions to property	5	91½	5.74
Central Indiana Power Co.	7,500,000	Twenty-five-year	First mortgage collateral and refunding gold bonds, series A	To acquire additional stocks and bonds of subsidiary companies	6	95½	6.35
Central Indiana Power Co.	2,000,000	Three-year	Collateral gold notes (closed issue)	For refunding and other purposes	7	99	7.39
United Railways & Electric Co. of Baltimore	2,500,000	Five-year	Gold notes	To meet maturing obligations	6	98	6.45
Bangor Railway & Electric Co.	450,000		Cumulative preferred stock, class B	To purchase new properties and for capital requirements	7	101	6.93
Consolidated Gas, Electric Light and Power Co. of Baltimore	2,000,000		Cumulative preferred stock, series B	To provide capital for acquisition of property and to replace money expended	7	Par	7
Georgia Railway & Power Co.	500,000		First cumulative preferred stock, series of 1922	To reimburse company for acquisitions, extensions, etc.	8	102½	7.80
Associated Gas & Electric Co. (N. Y.)	270,000		Preferred stock		3½	45	
Bar Harbor & Union River Power Co. (Me.)	500,000	Thirteen-year	First mortgage bonds of 1907	To obtain funds for additions	5	90	6.15
Caruthersville & Kennet Electric Light & Power Co. (Mo.)	100,000	One-year Two-year Three-year	Receiver's certificates of indebtedness		8	100.9 to 102.6	7.00
Clarion River Power Co. (Pa.)	2,700,000	Twenty-five-year	First mortgage gold bonds	To meet costs of operation	6½	97	6.75
American Water Works & Electric Co., Inc. (N. Y.)	1,200,000		Cumulative first preferred stock	To acquire control of Potomac Public Service Company through purchase of stock and for other purposes	7	87	8.05
Kansas City Power & Light Co.	5,666,100		First preferred stock, series A	To reduce debt contracted for extensions and improvements and for other purposes	7	93½	7.50
Havana Electric Railway, Light & Power Co. (Cuba)	3,600,000	Thirty-two-year	General mortgage sinking-fund gold bonds, series A	To provide funds for retirement of notes, falling due and for additions and betterments	5	85	6.07
Southern Colorado Power Co.	6,000,000	Twenty-five-year	First mortgage gold bonds, series A	To retire existing bonds and short-term funded debt	6	94	6.50
Oklahoma Gas & Electric Co.	500,000	Nineteen-year	First and refunding mortgage gold bonds, series B of 1921	To provide funds for payment of floating debt incurred for extensions and additions	6	94½	6 50
Toledo Traction, Light & Power Co.	6,500,000	Three-year	Secured gold notes	To retire maturing obligations	6	98	6.75
Total.	$51,886,100						

Illuminating Engineers Fix Convention Program

A well-balanced tentative program has been arranged by the Illuminating Engineering Society for the convention to be held at Swampscott, Mass., Sept. 25-28.

The first session, on Monday afternoon, Sept. 25, will be devoted to opening formalities, report of the secretary and reports of the committees on progress, nomenclature and standards, education and motor-vehicle lighting. On the following days papers will be presented at the morning and afternoon sessions with the exception of Wednesday afternoon, which will be occupied with entertainment and social features. One evening will be devoted to a symposium on "Fifteen Years' Advance in the Art of Lighting."

The following outline indicates the breadth and volume of subject matter to be discussed:

TUESDAY, SEPT. 26

Morning.—"Residence Lighting Practice": N. Macdonald, "Residence Lighting Practice in the United States"; M. Luckiesh, "Wiring and Lighting in the Middle-Class Home"; report of committee to prepare bulletin on residence lighting by electricity; report of committee to co-operate with fixture manufacturers; J. W. Gosling, "How to Tell Period Styles in Fixtures."

Afternoon.—"Commercial Lighting Practice": W. Harrison, "Overcoming Daylight Reflections in Show Windows"; W. Sturrock and J. M. Shute, "Effect of Light on the Drawing Power of the Show Windows"; J. L. Stair, "Illumination of Cafés and Restaurants"; W. H. Rademacher, "Lighting the Food Industries"; J. W. Lieb, "Performance of Tungsten Filament Lamps on Alternating Current and on Direct Current."

WEDNESDAY, SEPT. 27

Morning.—"Commercial Lighting Practice" (continued): H. B. Dates, "Practical Application of the Principles of School Lighting"; A. B. Emmons, "Office Lighting from the Viewpoint of Hygiene"; M. Luckiesh and L. L. Holladay, "The Cost of Daylight"; F. S. Mills, "Motion-Picture Studio Lighting"; C. E. Egeler and R. E. Farnham, "Screen Brightnesses for Motion Pictures."

THURSDAY, SEPT. 28

Morning.—"New Developments in Photometry": B. E. Shackelford and K. S. Weaver, "The Regular Icosahedron as a Substitute for the Ulbrecht Sphere"; C. C. Colby and C. M. Doolittle, "A Distribution Photometer of New Design"; F. A. Benford, "Methods of Plotting Spectrophotometric Curves (Tentative)"; B. S. Mills, "A Direct-Reading and Computing Attachment for Use on the Sphere Photometer"; C. E. Ferree and G. Rand, "A Theory Regarding the Difference in Results Obtained When Using the Flicker and Equality-of-Brightness Methods of Photometry."

Afternoon.—"General Lighting Subjects": E. S. Chaffer and W. F. Bovie, "Measurement of the Electrical Response of the Retina to Stimulation by Light"; report of committee on sky brightness; S. G. Hibben, "Lighthouse and Lightship Lighting"; C. A. Smirnoff, "Influence of Daylight Illumination Intensity on Electric Current Used for Lighting Purposes in the District of Columbia."

Practical Program Adopted for P. E. A. Meeting

For its fifteenth annual meeting, to be held at the Bedford Springs Hotel, Bedford Springs, Pa., on Sept. 6 to Sept. 9, the Pennsylvania Electric Association has adopted a comprehensive tentative program, of which the chief features follow:

THURSDAY, SEPT. 7

Morning.—Address of president; reports of committees on program, entertainment, exhibition and company employee organization; report of Public Relations Section, E. L. Smith chairman: (a) Women's information, Miss Clara H. Zillessen; (b) relations with bankers, John E. Zimmerman; (c) public speaking, Henry Harris; (d) employee relations with the public, Henry N. Muller; report of power-factor committee, Charles J. Russell.

Afternoon.—Report of Technical Section, George B. Wendle, chairman: (a) Hydraulic power, G. V. Goranson; (b) underground systems, L. W. Blaney; (c) electrical apparatus, William B. Flynn; (d) meters, S. N. McClurg; (e) prime movers, N. G. Reinicker; (f) overhead systems, P. H. Chase; (g) inductive interference, Henry Muller, chairman inductive interference committee, Pennsylvania Electric Association; A. E. Silver, chairman inductive interference committee, N. E. L. A.; Paul Spencer, member of joint comimttee on inductive interference, and others; (h) "Systematic Inspection of Lines and Equipment as a Means of Preventing Breakdowns," L. W. Heller, Duquesne Light Company, Pittsburgh; report of accident prevention committee, J. H. Shearer; "Accident Prevention," Charles B. Scott, chairman accident prevention comimttee, N. E. L. A.

Evening.—Public policy meeting: Addresses by W. H. Johnson, vice-president N. E. L. A.; M. H. Aylesworth, executive manager N. E. L. A., and William D. B. Ainey, chairman Public Service Commission of Pennsylvania.

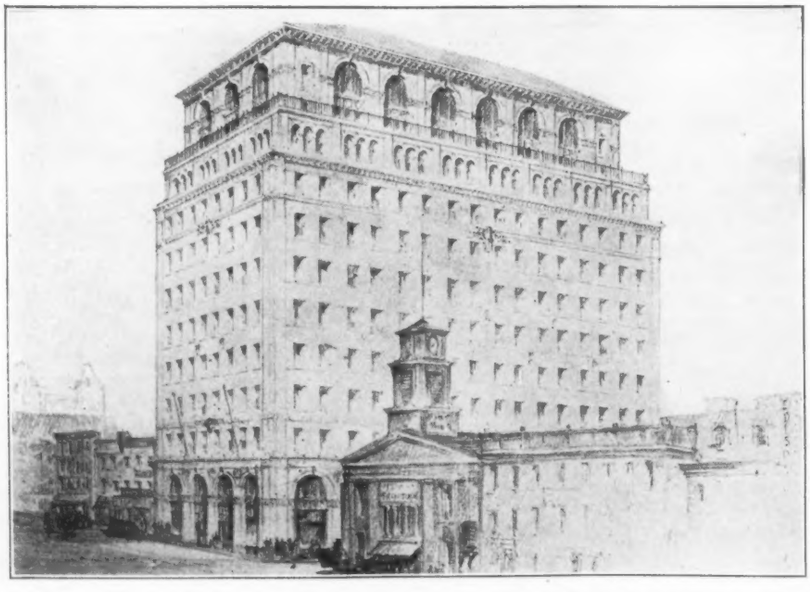
FRIDAY, SEPT. 8

Morning.—"Engineering Education as It Applies to the Central-Station Industry," R. L. Sackett, dean of engineering of Penn State College; report of Accounting Section, H. R. Kern, chairman; (a) Classification and application of accounts, M. W. Glover; (b) customers 'records and billing methods, John F. Ford; (c) purchasing and storeroom records, J. F. Torrence; (d) fixed-capital records, C. M. Breitinger; (e) budget, George P. Landwehr; (f) federal income-tax procedure, F. Heinbokel; (g) security holders' records, R. B. Keating; (h) credits and collections, B. P. Carey; (i) accounting education, Carl M. Schubert; (j) accounts payable, L. B. Harvey.

Afternoon.—Report of Commercial Section, G. M. Gadsby, chairman: (a) Lighting Sales Bureau, John M. Orr; (b) Electric Vehicle Bureau, Drew Johnston; (c) education committee, Max Hecht; (d) Merchandising Sales Bureau, William H. Wade; (e) Power Sales Bureau, J. Cox Thompson; "More Business Through Better Lighting," G. Bertram Regar, Philadelphia Electric Company; "Rural Lines," William H. Horton, Jr., West Penn Power Company: report of rate committee, Henry Harris.

A reception to President and Mrs. A. H. S. Cantlin will take place on Wednesday evening, Sept. 6. On Saturday the remaining committee reports will be rendered and officers elected.

New Office Building of the Brooklyn Edison Company



The Brooklyn Edison Company has started the erection of a new million-dollar office building at Willoughby and Pearl Streets. It will be a twelve-story structure and will house all the departments of the company.

More Power Projects Before Federal Commission

The Federal Power Commission has withheld action on an application by the city of St. Paul for a preliminary permit covering a power project on the St. Croix River. The commission withheld action pending the submissal of evidence by the city as to its authority to expend money outside of the limits of Minnesota or to purchase, condemn, own or operate property in Wisconsin. The St. Croix is a boundary stream, and a portion of the proposed works would be in Wisconsin.

The Southern Sierras Power Company of Riverside, Cal., has applied to the Federal Power Commission for a license covering a 15,000-volt distribution line, 8.4 miles long, to Palm Springs Resort, Cal.

The Empire District Electric Company of Galena, Kan., has applied for a preliminary permit covering a power project on the White and James Rivers above Branson, in Taney, Stone and Barry Counties, Mo., and in Carroll County, Ark. The dam is to be a reinforced arch 175 ft. high, the application states. The power house is to be connected with transmission lines to Joplin and will be connected with the lines of the Ozark Power & Water Company.

Charles E. Schaup, 304 Commonwealth Trust Building, Harrisburg, Pa., has applied for a preliminary permit covering a power project at the head of Sassafras Island. The project is to be operated in conjunction with the

Drumgold project in the Susquehanna River.

The Anaconda Copper Mining Company has applied for a license to cover its existing Georgetown project, now being operated under a Forest Service permit. The project is composed of the Georgetown dam, a wood-stave conduit and a power house with appurtenant structures and transmission lines.

The Holton Power Company has made application for a license for a transmission line to connect its line with the lines of the Southern Sierras Power Company at the plant of the Imperial Oil & Gypsum Company, in Imperial County, Cal.

The Southern Sierras Power Company has applied for a license for a transmission line about 2 miles long, to furnish power to the Bly stone quarry, in Inyo County, Cal.

The city of Los Angeles has filed an application for a preliminary permit to develop power on Pine and Morgan Creeks, Inyo County, Cal. The project contemplates the construction of five reservoirs with a combined capacity of about 8,000 acre-ft. A diversion canal and tunnel will carry the water to a power house on Pine Creek. The installed capacity will be about 18,500 hp.

Application has been made by the Bear Valley Utility Company for a license for a transmission line about 8 miles long, near Big Bear Lake, in San Bernardino County, Cal. The line will connect with those of the Southern Sierras Power Company and will furnish power to Big Bear Resort.

Earl Mucklow of Powell, Idaho, has applied for a license for a minor project intended to furnish power for a sawmill in the Shoshone National Forest.

Transit Commission Report Clears "Pyrene"

In a recent accident on the Interborough Rapid Transit Company's subway system in New York City many passengers were overcome by fumes, and New York papers said that phosgene poisoning had been caused by the use of "pyrene" to extinguish an arc.

A report made by the Transit Commission of New York completely exonerates the fire extinguisher. Experts from the Bureau of Mines declared that the symptoms were not characteristic of phosgene or carbon-tetrachloride poisoning. The chief of the materials-testing division of the Interborough Company asserted that "pyrene" was particularly adapted for fires produced by short circuits because it is a non-conductor. He said that if it was applied to red-hot metal, with oxygen present, phosgene gas and chlorine gas would result. Every symptom of those overcome in the subway, however, pointed to smoke fumes from the burning of insulation in a panel box, paint and varnish on the car walls and rubber cushions on the car doors as the cause of the distress, and the vapors and fumes from the carbon-tetrachloride were so diluted as to be negligible.

Brief News Notes

Ohio Electric Company Properties to Be Sold at Auction.—A sale at auction on Aug. 15 of the property of the Ohio Electric Company, which includes the Toledo-Lima interurban lines, an electric light and power plant, the steam-heating plants in Lima and the Lima street railway system, has been announced by the receiver of the company. The sale is subject to payment of mortgages of more than $1,000,000. Bids of not less than $2,000,000 will be accepted at the Toledo station of the company, the announcement says.

University Courses in Public Utilities.—Beginning with the next academic year, the University of Detroit will establish a comprehensive course in public utilities. Several other universities have established utility courses within the last few years, Ohio State University, Princeton and the Massachusetts Institute of Technology being among the latest. Utility students from the University of Illinois have, it is said, found avenues opened to them because such a course has been given at Urbana for some years.

A Mexican Hydro-Electric Scheme.—The Governor of Chihuahua, Mexico, has a project to issue $15,000,000 of bonds for the reclamation by means of irrigation of 420,000 acres of arid land in the valleys of the Conchos and San Pedro Rivers and the building of a large hydro-electric plant which will supplement the power service now being given by the Irrigation & Electric Power Company, a Canadian concern, from its big plant at Boquillas. From the reservoir that is already formed by the dam of this company the first land unit of 135,000 acres will be irrigated. The second will involve the building of a dam on the San Pedro River, the construction of an irrigation system and a hydro-electric plant and the reclaiming of 284,000 acres of land.

Consumers' Power Company Breaks Construction Record.—Breaking all company records for hydro-electric construction, the Consumers' Power Company hooked up two of its four new generating units at the Rogers station on the Muskegon River fifteen days ahead of schedule, conserving for other needs in Michigan about $15,000 worth of coal. The Rogers station of the company was destroyed by fire on Dec. 22 of last year. On July 1, with the station building only partly completed, with temporary line connections and switching equipment, and with the machines protected from the elements by shields of tarpaulin, two of the four new units were put on the line, feeding energy into the system and relieving steam plants of a load which required about $1,000 a day for fuel. The new plant is rated at 6,250 kw., and the annual output at 31,000,000 kw.-hr.

Hydro-Electric Resources of Utah.—In a talk before the Kiwanis Club at Salt Lake City, R. R. Wooley, hydraulic engineer of the United States Geological Survey, said that water-power sites in Utah are capable of developing 1,800,000 hp. for irrigation and other purposes. This estimate embraces sites on the Bear, Provo and Green Rivers and other surrounding mountain streams. Approximately 200,00 hp. is developed by the forty-six plants in operation, he said. All of the undeveloped sites are under government control.

Springfield (Ohio) Company Extending Its Service.—Contracts have been signed whereby the Springfield (Ohio) Light, Heat & Power Company will construct a 33,000-volt power line from Springfield to Urbana, a distance of 13 miles, for the purpose of furnishing an auxiliary power supply to the latter city. The contract was signed between the Springfield company and the Northwestern Ohio Light & Power Company, which is furnishing power to Urbana at present from a local station that has become inadequate.

Central Hudson Company Starting Development to Cost $2,500,000.—The Central Hudson Gas & Electric Company is preparing to construct a half-million-dollar dam on the Wallkill River at Rifton, N. Y., as an auxiliary in supplying light and power to the cities of that district, in which great industrial development is prophesied. The cost of building the new transmission line required, together with extensions to serve large industrial customers and the development of the hydraulic plant at Rifton, will be more than $2,500,000.

Hetch Hetchy Unit to Be Completed Within Two Years.—Work on the Moccasin Creek power house, a unit of the Hetch Hetchy project, will be completed within two years, simultaneously with the completion of the tunnel boring and dam and reservoir construction on the upper portion of San Francisco's forty-five-million-dollar hydro-electric undertaking, according to a statement made by the city engineers. Contracts for the machinery totaling more than $700,000 have already been let by the city, and nearly 200 men are at work at the Moccasin Creek site.

New York State Starts Work on Hydro-Electric Plant on Mohawk River.—On July 18 Governor Miller of New York State set off the blast starting the work of the state on the new hydro-electric plant southwest of the Crescent dam on the canalized Mohawk River. The act of the Governor was the first actual move of the State in hydro-electric development for other than Barge Canal purposes, $1,000,000 having been appropriated by the 1922 Legislature for the construction of power houses at the Crescent and Vischer's Ferry dam sites. It was stated by an official of the Department of Public Works that the Crescent plant would have a capacity of 16,000 hp. and that 8,000 hp. would be available

by Jan. 1, 1923. It is said that approximately $6,000,000 will be ultimately spent on the two sites west of Cohoes.

S. P. E. E. Activities.—At the recent meeting of the council of the Society for the Promotion of Engineering Education the plan of the deans of Middle West engineering schools for a five-year course was presented but not indorsed. The deans agreed among themselves to go ahead as a separate unit and develop the plan as originally laid down at the meeting in Chicago on May 19. The council of the S. P. E. E. at the same meeting decided to establish a new section within the society composed of deans and directors of engineering schools. This decision is the culmination of a discussion which started at the New Haven meeting last year. The new section will deal with general administrative matters and will not incorporate the organization of Middle West deans just referred to.

German Utility Securities Offered.—A large number of German utility securities covering light and power stations, street railways and railroads have been received recently by the Reparations Commission under the terms of Article 260 of the Treaty of Versailles. Some of the securities are open to bids by the allied governments, the United States and their citizens, while others may be acquired by responsible bidders from any country. The procedure to bid on the first group requires that bids be accompanied by evidence of American nationality, by similar evidence that the bidder is not acting on behalf of a foreign individual or government, and by a surety from a responsible bank guaranteeing the total amount of the bid. The Department of Commerce will assist American banks, firms or individuals to obtain the properties they desire, not only by sending the lists to the proper officers, but also by transmitting all bids and affidavits to the State Department for submission to the Reparations Commission. The date at which bids must be submitted will be announced later by the Reparations Commission.

Upper Tennessee River Water-Power Development.—The mineral resources and power possibilities of the Tennessee River and its tributaries in North Carolina, Tennessee, Alabama and Kentucky have been made the subject of exhaustive reports of army engineers transmitted to Congress. Reference is made to possible power developments on the river from Chattanooga to Riverton and at Coulter Shoals, 40 miles below Knoxville. Recommendation is made that a more detailed survey be authorized looking to development of the river for navigation and power purposes. The reports show that a large amount of hydro-electric power is now wasted annually in the upper section of the Tennessee River. It is said that at Coulter Shoals a minimum twenty-four-hour capacity of 14,000 hp. can be developed. Its transmission would be principally to Knoxville, where there is said to be a demand for power in excess of the supply. It is asserted that for 90 per cent of the time in an average year 18,400 hp. would be available, while for 57 per cent of the time from 40,000 hp. to 44,000 hp. could be developed. The initial cost of the project at Coulter Shoals, if built by the government, is estimated at $6,346,500 and the cost of operation at $257,300 annually. If built by private enterprise, the initial cost would be increased by $400,000.

Superpower Plants at Coal Mines Advocated in Oklahoma.—A study of the plan to build electric plants at the mouths of coal mines has been made by the School of Engineering of the Agricultural and Mechanical College at Stillwater, Okla., at the request of the State Board of Agriculture. The reports of the investigators are entirely favorable to the plan, by which, it is represented, the coal fields of the state could be more rapidly developed, great savings could be realized in freight costs, and industrial development would proceed more rapidly.

Boulevard Type Lighting for Boston.—An installation of seventy-six magnetite lamps mounted about 14 ft. 6 in. above the sidewalk on boulevard-type posts will shortly be made on Boylston Street, Boston, between Park Square and Copley Square, this being the first installation of this type to be made in the business district of the city. The lamps will be mounted opposite one another with spacings varying from 75 ft. to 80 ft., and will consume about 530 watts each. All-night and every-night service will be supplied by the Edison Electric Illuminating Company of Boston on its regular street-lighting contract with the city, and the new installation is expected to contribute materially to the upbuilding of this rapidly growing business section. Twenty-two existing lamps will be changed to conform to the new installation, which requires the purchase of fifty-four new units.

Radio Compass Proves Its Value.—The radio compass, which makes it possible for a navigator to pick up a definite signal a hundred or more miles off the station from which it is sent, has proved so successful in the waters around New York Harbor, where it has been used experimentally for some months, that installations are to be made in addition at a number of important points on the Atlantic and Pacific Coast, beginning with San Francisco. Its value was exemplified in the wreck of the Onataneda, which sent out distress signals from a point off the shores of Newfoundland. She gave her position by wireless, which was found to be 90 miles in error. The distress signal was picked up by several vessels, but only one of them, the Fanad Head, was equipped with a radio compass. While the other vessels were searching blindly for the ship in distress, misled by her mistaken announcement of her position, the Fanad Head had no trouble in running directly for her and was in time to rescue the crew.

Associations and Societies

Contractor-Dealers Plan for Cincinnati Meeting.—Preliminary plans for the twenty-second annual convention of the National Association of Electrical Contractors and Dealers, to be held at Cincinnati on Oct. 9 to Oct. 14, in the Hotel Sinton, point to one of the best meetings yet held by this body. "Business Yesterday, Today and Tomorrow," "The Supply Jobber and the Electragist" and "The Central Station and Business Development" will be the topics of the opening day. On the second day there will be a business session, and Col. Edward T. Miller, secretary of the United Typothetae of America, will make an address on "How an Employers' Association Functions." On the last day, among other important business, a proposed change of the name of the association to the "International Association of Electragists" will be acted upon. Arrangements for a boat trip on the Ohio River are being perfected.

Coming Meetings of Electrical and Other Technical Societies

A complete directory of electrical associations is published in the *Electrical World* in the first issue of each volume. See July 1 issue for latest list.

A. I. E. E., Pacific Coast Convention—Vancouver, B. C., Aug. 8-11. F. L. Hutchinson, 33 West 39th Street, New York, N. Y.

Michigan Electric Light Association—Ottawa Beach, Aug. 21-23. Herbert Silvester, Edison Bldg., Ann Arbor, Mich.

International Association of Municipal Electricians—New Bedford, Mass., Aug. 22-25. C. R. George, Houston, Tex.

New York Electrical League—Association Island, Sept. 5-7.

N. E. L. A. Geographic Divisions — New England, New London, Conn., Sept. 5-8; Southeastern, Atlanta, Sept. 12-15; Rocky Mountain, Glenwood Springs, Col., Sept. 11-13; Great Lakes, French Lick Springs, Ind., Sept. 28-30. M. H. Aylesworth, 29 West 39th Street, New York.

Pennsylvania Electric Association—Bedford Springs, Pa., Sept. 6-9. H. M. Stine, 212 Locust St., Harrisburg, Pa.

Association of Iron and Steel Electrical Engineers—Cleveland, Sept. 11-15. J. F. Kelly, Empire Bldg., Pittsburgh, Pa.

American Electrochemical Society — Montreal, Sept. 21-23. A. D. Spillman, Columbia University, New York City.

Illuminating Engineering Society—Swampscott, Mass., Sept. 25-28. Samuel G. Hibben, 29 West 39th Street, New York.

American Institute of Mining and Metallurgical Engineers—San Francisco, Sept. 25-28. F. F. Sharpless, 29 West 39th Street, New York.

National Association of Railway and Utilities Commissioners — Detroit, Sept. 26. J. B. Walker, New York Transit Commission, New York.

Illinois State Electric Association—French Lick Springs, Ind., Sept. 28-30. R. V. Prather, 305 Illinois Mine Workers' Bldg., Springfield, Ill.

Indiana Electric Light Association—French Lick Springs, Ind., Sept. 28-30. Thomas Donohue, Lafayette, Ind.

American Electric Railway Association — Chicago, Oct. 2-6. J. W. Welsh, 8 West 40th Street, New York.

Empire State Gas and Electric Association —Lake Placid, Oct. 5-6. C. H. B. Chapin, Grand Central Terminal Bldg., New York.

Association of Edison Illuminating Companies — White Sulphur Springs, W. Va., Oct. 11-14. Preston S. Millar, 80th St. and East End Ave., New York.

National Association of Electrical Contractors and Dealers—Cincinnati, Oct. 9-14. F. Johnson, 15 West 37th St.

Electric Power Club—Asheville, N. C., Oct. 30. S. N. Clarkson, 506 Laclede Gas Bldg., St. Louis.

Commission Rulings

Determination of Active Load.—An electric company may, said the Michigan Public Utilities Commission in approving certain changes in rules asked by the Consumers' Power Company, properly exclude from the connected load all vacant sockets when arriving at the determination of active load of residence lighting customers.

Acquisition of Scattered Utilities by Holding Companies Opposed.—In refusing approval of a stock issue which the Interstate Utilities Company desired to float in order to acquire small utilities in four states, the Michigan Public Utilities Commission declared its opposition to the plan of operating widely scattered public utilities by means of a holding company as not in accordance with ordinary business principles. Its experience, the commission said, inclined it to the belief that no good result is thus attained.

Redemption of Certificates and Stock Dividends.—Although the redemption of certificates of indebtedness issued to stockholders and payable only in common stock is, in the opinion of the Indiana Public Service Commission, in effect an evasion of the law prohibiting the issue of stock dividends, the commission decided to allow it in the case of the Noblesville Heat, Light & Power Company, this company having a large surplus accumulated during years when dividends were withheld, salaries of officials were insignificant and all earnings were put back into the property.

Improper Interpretation of Interest and Charges During Construction.—Passing on an application of the Wisconsin-Minnesota Light & Power Company for authority to issue bonds, the Wisconsin Railroad Commission condemned the company's practice in charging to capital account as interest and taxes during construction such part of the interest and taxes as was represented by the proportion that the actual output of the property bore to the theoretical capacity. "If this practice were uniformly followed by all the utilities of the state," the commission observed, "it would result in the rapid inflation of property accounts due to the continual charges for interest and taxes upon the property. We know of no public utility property where the output anywhere near equals the theoretical capacity of the plant. . . . In auditing the construction accounts of the company the commission has allowed as a capital expenditure the full amount of interest and taxes up to the time that the first three generators were put in operation. From that time until the final three were put in operation one-half of the interest and taxes were charged to construction because the property was half completed. After the property was completed by the installation of the final three generators no interest or taxes were included in construction account, but all became charges against the operating income of the company."

Returns from Different Branches of a Utility Must Be Kept Separate.—In passing upon an application from the Trinidad Electric Transmission, Railway & Gas Company for permission to abandon certain railway tracks, the Colorado Public Utilities Commission, answering a contention that the business of the company as a whole should be considered in deciding the question of loss, again declared, as it had had occasion to do in other cases, that the return from each branch or class of a public utility company's business must be considered separately for the purpose of determining whether service should be discontinued—not the return from the business of the company as a whole—because one class of customers must not be charged for service rendered to another class.

Deduction of Accrued Depreciation.—The Missouri Public Service Commission, in valuation proceedings for the Carthage Gas Company, remarked concerning the relation of accrued depreciation to estimates of cost of reproduction new: "Where full theoretical appreciation is included, as it is in the cost of reproduction new as of a specific date, there can be no objection to the deduction of the full theoretical accrued depreciation. In applying the cost-of-reproduction-new theory of valuation the company must accept its disadvantages as well as its advantages. However, when considering the investment as a factor in fixing fair present value, no deduction should be made for accrued depreciation unless such depreciation has been earned over and above a fair return on the investment."

Uniform Rates Ordered.—The Public Utilities Commission of Utah has entered a decision denying the application of the American Foundry & Machine Company for a special rate, based on power consumption only, with which to operate its electric furnace. The application was filed about three years ago. This case has been held pending decisions in the special contract case and the application of the Utah Power & Light Company for an increase in its regular power schedules, which cases were decided some time ago. The foundry company alleged that it could not afford to pay the regular schedule rates, particularly the demand charge, for power. The commission, however, argues that if it were to take into consideration the ability to pay of a single customer it would end in every customer having a different rate, and all uniformity of rate structure would be destroyed, with illegal discrimination the result. "Rates," it says, "must be based upon cost of service," which was the consideration kept in mind by the commission in fixing the present power rate schedule of the Utah Power & Light Company.

Recent Court Decisions

Gross Receipts of Operating Company Include Rent Paid to Power Company.—In Columbia Railway, Gas & Electric Company vs. Jones the South Carolina Supreme Court has sustained the lower court in holding that the Columbia company and the Farr Shoals Power Company, which owns the plant operated under agreement by the company first named, are separate and distinct corporations and that each is subject to the state license tax upon gross receipts, including in the case of the Columbia company the rent or money paid to the power company. (112 S. E. 267.)

Power Company Is Obliged to Supply Specified Horsepower to City's Energy-Consuming Devices at Any Time Required.—Where power company's contract with city provided that the minimum horsepower to be furnished city should not be less than 70 hp. and required the city to pay therefor "$2 for each contract horsepower of connected load, which payment entitles it (the city) to consume 25 kw.-hr. for each contract horsepower" per month, and the decree in city's action to enforce performance of contract required the company to furnish the city "a 70-hp. connected load for the operation of its waterworks system and to comply with the contract that has been filed in this cause," the company was required to supply a minimum of 70 hp. to the city's energy-consuming devices at any time it might be required. This decision was handed down by the Court of Civil Appeals of Texas in Telluride Power Company of Texas vs. City of Teague. (240 S. W. 950.)

In Damage Suit Where Death Is Ascribed to Excessive Current Count Must Allege that Necessary Current Was Safe.—In Brown vs. Mobile Electric Company it was alleged that the defendant caused the death of a motion-picture operator by furnishing him with current for use in his business at an excessive voltage. The Supreme Court of Alabama found that the count was defective because it did not allege that the reasonably necessary current contracted for was not dangerous to human life, since, if both currents were equally dangerous, the negligent furnishing of excessive current was not the proximate cause of death. The lower court did not err in sustaining a demurrer to the count thus criticised, but was wrong in charging that under the evidence the jury ought to find for the defendant, for the jury and not the judge has the duty of deciding the credibility of evidence. The finding was therefore reversed and the case remanded. (91 So. 802.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Men of the Industry

Changes in Personnel
Accomplishments, Responsibilities, Honors, Appointments and Activities of Men
Engaged in all Branches of the Electrical Industry

T. E. Barnum New Vice-President of Electric Power Club

At a recent meeting of the Electric Power Club T. E. Barnum, chief engineer of the Cutler-Hammer Manufacturing Company, was elected vice-president of the association. Mr. Barnum has taken a prominent part in the activities of the Electric Power Club for many years. He has been a member of the board of governors for the past five years and in addition is representative of the club on the sectional committee of the American Engineering Standards Committee on elevator standards and also on the sectional committee on elevator safety code.

T. E. BARNUM

L. F. Hardy Public Utilities Commissioner

The appointment of Leonard F. Hardy as a member of the Massachusetts Department of Public Utilities was recently announced. Mr. Hardy succeeds A. R. Weed, who resigned to accept an appointment as justice of the Superior Court. He was born at Weedsport, N. Y., Oct. 24, 1875, and has had a distinguished legal career. He was a member of the Massachusetts House of Representatives from 1910 to 1913 and has been in the Massachusetts Senate since 1918.

A. R. Weed Justice of Massachusetts Superior Court

The appointment recently announced of Alonzo R. Weed as justice of the Massachusetts Superior Court brings to the bench a man of wide experience in the public utility field. Mr. Weed was graduated from Harvard in 1887 and three years later from Boston University Law School. He was appointed to the Massachusetts Gas and Electric Light Commission in 1906 and served as chairman from 1913 to 1919. Since the establishment of the Massachusetts Department of Public Utilities in 1919 he has served as a commissioner. In the public utility field his comprehensive grasp of the problems of modern management and his open-minded fairness have won high regard.

E. L. Franklin Elected President of O. E. L. A.

Emerson L. Franklin, manager of the Warren Division of the Ohio Public Service Company, has been elected as president of the Ohio Electric Light Association. Mr. Franklin was born in Wolfville, Nova Scotia, and has spent twenty years in the electrical industry. His education was obtained in Acadia University, Wolfville, and McGill University, Montreal. He was graduated from the former college in 1900 with a B. A. degree and from the latter in 1902 with a B. S. in electrical engineering. In September, 1902, he joined the Easton Power Company, Easton, Pa., as chief engineer. In 1907 he was advanced to superintendent and five years later was made secretary. The Eastern Pennsylvania Power Company was formed in 1912 by a consolidation of electrical power companies in and around Easton, and Mr. Franklin was appointed general superintendent of this group. He resigned this position the following year to accept the position of plant superintendent of the Empire District Electric Company, Joplin, Mo., and in 1914 organized and directed "results engineering" work for the properties of the Cities Service Company in Missouri, Kansas, Oklahoma and Nebraska. In June, 1914, he was made general manager of the Trumbull Public Service Company of Warren, Ohio, and when this property was consolidated with the other Ohio properties in 1921 he was appointed to his present position. Under his management the gross income of this property has increased ten times and the output in kilowatt-hours more than twenty-five.

S. Glen Vinson, secretary and general manager of the Ideal Electric & Manufacturing Company of Mansfield, Ohio, is traveling in the Orient in order to make a survey of business conditions. Mr. Vinson will include on this trip all the larger cities in Japan, China, the Philippine Islands and India. He expects to return to the United States about Oct. 1.

F. B. Chapman Receives Promotion

The vacancy which occurred a short time ago in the Eastern sales managership of the Bryant Electric Company has been filled by the selection of Frank B. Chapman as successor to George V. W. Ingham Mr. Chapman has devoted thirty years of his life to the electrical industry. In the early nineties he was connected with the Utica Electrical Manufacturing Company of Utica, N. Y., which was in reality the construction department of the Utica Light & Power Company. When the department was abandoned Mr. Chapman, with the assistance of two of his associates, incorporated the B. & C. Electric Construction Company of Utica, doing general construction work not only in Utica but also in parts of the South, where the firm installed electrical equipment in a number of cotton mills. After five years Mr. Chapman disposed of his interests and affiliated himself with the Roller Smith Company as salesman of precision instruments, circuit breakers and similar material. Two years later he resigned to accept a position as field representative with the National Carbon Company. Since 1912 he has been associated with the Bryant Electric Company in the capacity of field representative in the Middle Atlantic and Southern States. Mr. Chapman will make his headquarters at the factory in Bridgeport.

F. B. CHAPMAN

A. E. Novey Heads New Chicago Jobbing House

A. E. Novey is the president of the newly formed Electrical Merchandising Corporation of Chicago and brings to this organization years of experience gained in the electrical field. Mr. Novey started his electrical training as a draftsman's tracer for the Kellogg Switchboard & Supply Company in 1900 at the age of fourteen years and remained there until 1905, reaching the

goal of head apparatus designer. He then joined the Electrical Supplies & Fixture Manufacturing Company as superintendent of manufacture, but in 1916 became associated with the Montgomery-Ward Company as buyer in its chandelier department. In 1917 Mr. Novey transferred his service to the Peerless Light Company as advertising manager. He remained a year and then became president of the Co-operative Electric Supply Company, remaining there until March, 1922, when his new company was organized.

M. C. Rypinski Joins C. Brandes, Inc.

M. C. Rypinski, formerly radio sales manager of the Westinghouse Electric & Manufacturing Company, has associated himself with C. Brandes, Inc., New York City, as vice-president and sales manager. Mr. Rypinski's career is the story of an engineer who has successfully mastered the art of salesmanship and merchandising. His technical education was received at the Rose Polytechnic Institute of Terre Haute, Ind., from which he was graduated in 1897. Soon afterward he became a member of the engineering staff of the General Electric Company in the

M. C. RYPINSKI

capacity of assistant to the chief of the standards laboratory. Between the years 1902 and 1906 he was associated with independent instrument manufacturers, and then he joined the Westinghouse Electric & Manufacturing Company of Pittsburgh, where he has obtained fifteen years of broad business and engineering experience. During the war, as chairman of the instrument manufacturers' committee and a member of the transformer manufacturers' committee, he was able to do much toward the solution of the many technical problems that confronted these bodies.

In August, 1920, he was placed in charge of the commercial exploitation of the radio telephone. The famous "KDKA" station which he and his associates erected at Pittsburgh formed the nucleus for the extraordinary growth of radio which has taken place in the past two years. As radio sales manager of the Westinghouse company he was in a position to study at first hand the commercial and merchandising problems that naturally arose in the new industry. Mr. Rypinski is the new chairman of the radio apparatus section of the Associated Manufacturers of Electrical Supplies, where the important part he has played in the establishment of radio broadcasting will make his services of great value.

C. Chester Stewart, formerly chief electrical engineer with the Sinclair Refining Company, is now connected with the Oklahoma Gas & Electric Company in the capacity of commercial engineer.

W. B. Britt, formerly associated with the Engineering Service Company of Charleston, W. Va., has become the owner of an engineering and contracting business known as the Britt Electric Company.

W. B. McSpadden, new-business manager of the City Light & Water Company, Amarillo, Tex., has been appointed chairman for Texas of the executive committee of the Commercial Section of the Southwestern Geographic Division of the N. E. L. A.

F. H. Brain, a hydro-electric engineer for the city of Hobart, Tasmania, has come to the United States to spend a year studying the newest developments in hydro-electric engineering with a view to adapting them in the development now under way of Tasmania's great potential water power.

Major Cary H. Brown, assistant engineer commissioner for the District of Columbia since March, 1919, has been assigned to duty at the engineer school at Camp Humphreys, Va. As assistant engineer commissioner, Major Brown has had jurisdiction over the electrical, water and sewer departments and the office of the building inspector of the District.

Thomas F. Kennedy, formerly new-business manager of the Western Light & Power Company, Boulder, Col., and the Denver Gas & Electric Light Company, subsidiaries of the Cities Service Company, has recently been transferred to New York, where he will be assistant manager of the new-business department of the Cities Service Company.

Charles J. Nicholson, formerly connected with the Lundale Coal Company, Lundale, W. Va., has joined the Brooklyn Edison Company in the capacity of assistant engineer of electrical construction.

A. M. Jackson, chairman of the Rocky Mountain Electrical Exposition committee, is now in the East making a number of calls on important manufacturers in connection with the exposition, which is to be held in Salt Lake City next fall. His itinerary will include New York, Boston, Philadelphia, Baltimore, Rochester, Syracuse, Buffalo, Pittsburgh, Detroit, Cleveland, Toledo, Dayton, Chicago and a number of towns in Connecticut. During his absence P. M. Parry, commercial manager of the Utah Power & Light Company, will act as temporary chairman of the committee.

H. B. Kirkland Returns to the American Wiremold Company

H. B. Kirkland has returned to the American Wiremold Company as vice-president after several years with the General Electric Company. Mr. Kirk-

H. B. KIRKLAND

land was born in Boston in 1870 and entered the electric field as wireman's helper in Washington, D. C., in 1887, spending some years with the Marr Electric Construction Company, whose headquarters were in Pittsburgh. He entered the commercial field in 1891 and has been in the conduit branch of the industry ever since with the exception of a short period.

Obituary

George Badner, representative of the Central Hudson Gas & Electric Company in Marlboro, N. Y., recently died at his home in Marlboro. Mr. Badner had been the local representative of the company from 1901 until the time of his death. He was highly esteemed by the entire organization and also by the community in which he lived.

Harry I. Wood, fifty-two years old, a prominent figure in Louisville's business life, died at his home there July 25. Mr. Wood had been engaged in the electrical business twenty-eight years. The Harry I. Wood Electric Company was formed by him about twenty years ago and he was in active charge of it until recently. He was engaged in forming a new company when his death occurred.

Manufacturing and Markets

Devoted to the Discussion of Business and Economic Problems of the Producer and Distributor, with Market Reports, Trade Activities, Foreign and Construction News

The Problem of Elimination

Influence of the Demands of Progress and Present Catalog Practice —Who Should Take the Initiative in Reducing Excess Styles and Types on the Multiplicity of Varieties

By F. V. Burton
Sales Manager Henry D. Sears, Boston

EVERY manufacturer of wiring devices and probably of other lines is impressed with the desirability of keeping the variety of devices which he manufactures at a minimum. Yet it is not an easy matter to handle, and the point at which this expansion should stop or production be discontinued is not simple to define.

There is no doubt that the worth of a business firm is frequently judged by the size of its catalog, and it has not been uncommon in the electrical business for small manufacturers to resort to various kinds of "padding" in order that their catalog should make an impressive showing. I do not think, however, that this has been much of a factor in the troubles of which the jobbers complain. The large manufacturers have been the offenders (if it is an offence) by being willing to manufacture almost anything that a good customer asked for, and once having made the investment in development expense, dies and tools, the best procedure has seemed to be to catalog the article, as about the only way of finding out whether or not any one else had a use for it.

F. V. BURTON

Demand of Progress

It is a difficult question, also, to decide how much of a brake can be put on the development of new devices and yet not hamper the progress of the industry. New requirements are constantly developing, and it would be most unfortunate if there were not a receptive attitude on the part of manufacturers to suggestions as to new devices with which these new requirements could be met. Take as an example the matter of candle sockets. Ten years ago they were unknown. Today they are made in both the keyless and pull varieties, and the annual sales run into the hundreds of thousands. Yet they had their origin in the suggestion of one fixture manufacturer who wanted to do a better job than could be done with the devices which were previously available. I do not know of any other practical procedure. Wiring devices die from various causes, some of old age, some in infancy, and some are "still born." The only question to be decided is, how long, after life is extinct, shall a device be cataloged in the expectation of a second reincarnation.

"Patent" Catalog

Possibly the "patent" catalog has something to do with aggravating the situation. The composition for the pages for these catalogs is paid for by the manufacturer, and he, being unwilling to admit that there are any unworthy articles in his line, pays the catalog builder for making plates that cover everything he manufactures. I have sometimes thought that it might be a help to every one concerned if the jobber would catalog only the things which he carries in stock and let the promotion of new articles be accomplished by means of the manufacturers' catalogs.

Preferential Prices

A condition which may have more to do than anything else in settling this question is the policy adopted by many manufacturers within the past year of quoting preferential prices on a limited number of the most active sellers. Take, for instance, the matter of fuseless and fusible rosettes to which Mr. Sargent refers in his recent article. Formerly these sold to the jobber at a difference of only about half a cent apiece. Today the difference is almost 6 cents. A similar situation exists regarding two porcelain receptacles listed by ourselves and most manufacturers as No. 50715 and No. 9402. These formerly sold at the same price. Today the former sells at practically half the price of the latter. When this policy has operated for a little longer time, many manufacturers will discover that there is no longer any demand for a device which once upon a time constituted an important link in their line of material.

In other words, there are a limited number of devices that can be looked upon as being commodities. The reason that some cognate device is demanded is usually that in some way it saves money to the person who is going to use it. It is therefore for the purchaser to decide whether or not the saving exceeds the additional amount asked for the device. If enough people feel that it does, that device will probably some day or other become a commodity.

The problem, therefore, is not a simple one. But it is one which demands and should receive attention and constructive help from all the parties to the distribution of electrical goods.

Excess varieties add expense and are not needed. Who should take the initiative in elimination?

The Jobber and His Future

The Five Fundamental Principles Upon Which the Electrical Wholesaler Must Develop His Business

BY FRANK S. PRICE
President Pettingell-Andrews Company, Boston

THE electrical jobber established himself in the electrical field as soon as the opportunity presented itself for the same reasons and in the same manner as wholesalers and jobbers established themselves many years ago in other lines of trade. He came into existence about thirty-five years ago when individuals began to anticipate demand and became willing to order in large lots from the manufacturer and render real service to the trade.

The jobber has continued to conduct a successful busines up to the present time. The last few years, however, have brought about many changes, such, for instance, as the increase in the number of electrical manufacturers as well as of manufacturers of other lines going into the production of electrical material. The jobbers have also increased in number proportionately. This rapid growth, constant change and other factors in the electrical industry have made it difficult for any branch to establish definite policies or policies which could remain permanent for any length of time.

COMPETITION IN THE TRADE

The jobber has naturally and of necessity been very aggressive in endeavoring to take advantage of every opportunity to increase his business and profits. The manufacturers, owing largely to the lack of well-established and proved trade policies, have recognized local dealers as jobbers. Many of these so-called jobbers, having little or no capital, are unable to carry an adequate stock, but solicit orders on a price basis to be shipped direct from factory. Obviously they do not function as jobbers. This practice has been particularly noticeable among the more recent manufacturers in the electrical field, some of whom are offering on staple lines what is properly termed "plunder merchandise." In fact, both jobbers and manufacturers have ignored certain points of ethics which are respected in other trades.

Competition is, therefore, very keen, and probably will be for some time to come, and the future success of the electrical supply jobber will depend more and more on his ability to conduct his business on strictly economical lines. Some jobbers who are conducting their business along the lines of the opportunist, and who depend largely upon speculative opportunities which offer only an immediate profit or advantage, will find it difficult to show a proper return on their investment. But we must expect always to have with us in some form the type of jobber who operates as a "pirate merchandiser."

PRINCIPLES THAT CONTROL

The future of the electrical jobber holds the greatest possibilities, but only for that jobber who conducts his business upon sound, scientific principles, developing his business by a thorough knowledge of up-to-date methods of merchandising and with a broad vision of future possibilities. The most important of these fundamental or what have been termed scientific, principles may be included under these five headings:

1. *Permanent Relations with Manufacturers.*—I mean by this that if the jobber can perform the service of distributing at a cost lower than the manufacturer, the manufacturer must of necessity recognize this fact and shape his policies so that the jobber shall receive ample and sufficient recognition. It is with such manufacturers that the jobber should establish permanent relations.

2. *Territory.*—The territory that a jobber should cover is that territory contiguous to his place of business which he can economically serve, on a sound basis, the factors of economy for comparison being:

(a) Transportation rates from warehouses to customer and the time element.

(b) Proximity to customer which would enable the distributor to obtain maximum results from minimum sales expense.

(c) The distributor's possibilities of handling credit and collections to the best advantage and with minimum expense.

In other words, it is that territory in which he will not be obliged to adopt practices which are not altogether sound.

3. *Merchandise Stocks.*—It is important to have a carefully selected and complete stock of merchandise based on the demands of the territory. The maximum number of turnovers possible should be obtained on a jobber's warehouse stock, in order to enable him to function economically. A careful analysis should be made of the number of turnovers of each commodity.

We must not overlook the fact that there are times when we must carry slow-moving stocks which may cover new lines on which we are building up a future demand and on which we cannot obtain a fast turnover until the demand is created. There will also be found some articles which a jobber must stock for which there is an infrequent demand. But such articles are a necessity in order that the customer may be accommodated.

When discussing the question of compensation with a manufacturer the number of turnovers on a particular commodity should be taken into consideration.

4. *Accounting and Cost System.*—The jobber must support his business with an accurate and adequate accounting system. The Electrical Supply Jobbers' Association devised and adopted a uniform accounting system in December, 1918, which was revised in September, 1919, and is fully covered by Information Bulletin No. 303. This system is the best available.

5. *The Administrative Features in Regard to Shaping Sales.*—This is the fifth and last heading selected, but perhaps the most important, and it surely holds forth the greatest possibilities for successful endeavor. This is particularly true because sound thinking leads us to believe that we are now at the beginning of an era of progressive expansion of electric service for the home office and factory.

A careful and scientific analysis should be made of the demand for electrical merchandise in the territory in which the jobber operates. An analysis should be made showing the demand of each class of buyers, such as dealers, contractors, industrial plants and central stations; also an analysis showing the demand for each commodity. In the case of a new device an analysis of the territory may be made based on the demand of prospective customers, and we should assist the manufacturer of such devices to create a demand.

The opportunities for sales exploitation of household conveniences or standard illuminating units offer one of the greatest fields of endeavor for the jobber. We must bear in mind, however, that with the introduction of a new device there is a sales exploitation expense that is not required on staple lines. The compensation allowed by the manufacturer as a rule does not include this expense, but somebody must meet it, and it should be definitely settled before engaging in such a practice that the expense must be met either directly by the manufacturer or indirectly by the manufacturer through the jobber. If the manufacturer will consider the creation of the new demand his problem, let him do the work. If the manufacturer expects the jobber to create the demand, then the jobber should receive a further compensation commensurate with the sales effort.

WHOSE RESPONSIBILITY?

The jobber should be paid for handling the entire distributing function on all regular goods, and therefore should make all shipments from his warehouse except in such wholsale quantities as can be more economically handled by shipping direct from the factory. We should not attempt to handle merchandise where it is proved that the manufacturer can distribute more economically direct or through other channels. We should give careful consideration to lines which we are handling today that may be questionable and without prejudice endeavor to establish the most economical method of distributing them.

Chicago Motor Trade Reported Brisk

The July motor business for Chicago and the Middle West, according to reports from five manufacturers, have been very encouraging. One firm states that July was their best month for more than a year. Another concern says that their July sales have equaled those of May and June, two months which were very active. The sale of motors under 20 hp. is continuing steadily and the larger sizes are moving better than previously. All the companies are unanimous in reporting that the motor market has seen a decided change over the slow trade of the past year and a half. Most of this equipment is well distributed, and manufacturers state that orders and inquiries are arriving from many sources. The industrials are buying consistently, planning either for further power extension or replacements of old equipment.

Britain Is Now Canada's Best Customer

The United States, which in the fiscal year ended June 30, 1921, was Canada's best customer by a wide margin, has been displaced by Great Britain, it was disclosed when the books were balanced on June 30 of this year.

During the first period Canada's exports to the United States totaled $502,000,000 and those to the United Kingdom $307,000,000.

In the year covered by the latest report, Great Britain, with purchases amounting to $301,838,000, won first place from the United States, which shipped only $295,398,000.

English Radio Broadcasting Conditions Are Uncertain

There is still much uncertainty regarding the conditions under which wireless broadcasting will be carried out in England, according to the electrical division of the Department of Commerce.

Differences have arisen between manufacturers and the Postmaster General, and conferences are now being held, attended by representatives of between forty and fifty firms, including those which have applied for licenses to broadcast. The vital question is as to the erection of broadcasting stations, one group wishing to have the construction of all of them handled by one organization, and the other, composed of smaller manufacturers, opposing this plan, which they characterize monopolistic.

The scheme as outlined calls for eight stations, which are expected to cost approximately £20,000 each. In connection with the cost of the broadcasting program it has been suggested that the government's "listening-in" license fee be increased and that the additional sum thereby obtained be placed in a common fund out of which the program would be provided. At present it is proposed to charge for registration of receiving sets.

Industrial Electric Trucks in Better Demand

After a long period of dull business, a healthier demand for industrial electric trucks and tractors is taking shape, and the outlook for the remainder of the year is more than hopeful.

The resumption of production on a substantial scale by large manufacturing plants in many industries has resulted in the putting into service of internal transportation equipment which in not a few cases has been but partly used since the close of the post-war boom. The pressure upon factory managers to reduce unit costs is leading to more inquiries as to the applicability of trucks and tractors in labor and time-saving tasks. Some of the older units of equipment also have approached the point where replacement is worth considering, and the demonstration by manufacturers' engineers that trucks can be economically justified in much smaller plants than used to be the case is helping this business. Some difficulty is being encountered at present in the supply of steel for truck and tractor frames, but this is believed to be only temporary.

Prices on several well-known makes have been substantially reduced from the war-time levels, and a better understanding of the limitations and use of such equipment is helping to establish a much more stable market for this important electrical accessory.

Business Restrained, Declare Reviews

Business recovery has unmistakably been restrained in the last week by existing strike conditions, according to weekly reviews. Since the issuance of the order giving priority to food and fuel shipments, and the additional pressure brought to bear by national and state officials to end strikes a little more confidence has developed in trade circles.

Dun's Review says: "Although this is normally the quietest period of the year, the prevailing drawbacks tend to accentuate the summer abatement of activities and to prompt a waiting policy in different quarters. Without strikes to impede the movement, an extension of the general business expansion, allowing for

seasonal fluctuations, would be witnessed."

Bradstreet's says: "The railroad and coal strikes, involving the idleness of nearly 1,000,000 men, continue the big overshadowing features of industry and trade. The dwindling of supplies of fuel and the congestion of shipments of other materials proceeding therefrom have made for a slowing down of the industrial pace."

Loading of Freight Totaled 860,907 Cars

Loading of revenue freight totaled 860,907 cars during the week which ended on July 15, compared with 718,319 cars during the preceding week, which included a holiday, or an increase of 142,588 cars, according to reports just received from the railroads of the country by the American Railway Association. This was practically the same number of cars as were loaded during the week of June 17 last and was an increase of 86,023 cars over the corresponding week last year.

Reports just filed by the railroads of the country showed 405,120 freight cars to be idle because of business conditions on July 8, compared with 405,185 on July 1, or a reduction of sixty-five cars.

Of the total, 239,160 were surplus freight cars—that is, cars in good repair in excess of current freight requirements—while the remaining 165,960 were freight cars in bad order in excess of the normal number unfit for service.

Surplus coal cars totaled 146,743 cars, a reduction within a week of 815, but surplus box cars amounted to 61,067, or an increase of 966 cars within the same period. Surplus coke cars totaled 3,816, a reduction since July 1 of 129, but an increase within that time of 164 was reported for stock cars, which totaled 12,016.

Platinum Advances $3 an Ounce

Platinum has advanced again, this time $3 an ounce. The rise puts the quotation for the so-called soft metal at $93 an ounce, for the medium metal at $98 an ounce, and for the hard at $103 an ounce. The medium and hard metals contain 5 and 10 per cent of iridium, respectively, for hardening purposes. Iridium itself is now priced at $185 an ounce.

New England Collections Are Fair

Differences among jobbers' views as to locations are apparent in this district as August opens, but on the whole nothing alarming is reported as to conditions. A fair average is from fifty-five to eighty days. Electrical contractors of the smaller ratings are giving the most trouble. Some houses find things tighter because of labor troubles in the textile, coal and railroad fields. Others report that they are well rewarded by constant study of and work upon outstanding accounts. Public utility and railroad buying has improved, and the outlook is good, barring a protracted fuel strike.

Brass Company Announces Higher Prices

The American Brass Company has announced an advance on finished brass products ranging from $\frac{3}{8}$ cent to $\frac{1}{2}$ cent per pound, with the exception of high brass rods which were advanced 1 cent per pound. Brazed copper tubing is unchanged, but commercial bronzed tubing is advanced $\frac{3}{8}$ cent.

Fourteenth Electrical Census Issued

The Department of Commerce in a bulletin just published gives in part the following information concerning the electrical industry as gathered in the fourteenth census of manufacturers:

"Statistics for incandescent lamps for 1919, 1914, and 1909 show an increase in value over that for 1914 of $40,296,515, or 232.3 per cent. The tungsten type formed 80.9 per cent of the value of all incandescent lamps manufactured in 1919 and 68.5 per cent in 1914. The gem type was included with vacuum and vapor lamps to avoid a disclosure of individual operations.

"Production of telegraph instruments and apparatus in 1919, 1914, and 1909. The first and third groups show, for the period 1914 to 1919, increases in value of 1,211.9 per cent and 1.065.9 per cent, respectively. The figures for radio and wireless do not represent the magnitude of the installations, as they cover only the instruments and appliances turned out by the factories during the census years."

"Telephone apparatus for 1919, 1914, and 1909: The aggregate value of all telephone apparatus, parts, and supplies produced in 1919 shows an increase of $23,398,702, or 102.6 per cent, over that reported for 1914. Private branch exchange switchboards in 1919 show a value of $2,287,122, as compared with $448,203 in 1914, an increase of 410.3 per cent. For the same period the value of automatic switchboards increased 331.6 per cent."

Metal Market Situation

No copper for domestic shipment is obtainable under the price of 14 cents delivered. Moderate inquiry is making the rounds, and a fair amount of metal is being sold considering domestic conditions. It is said that the output of Lake copper will be greatly restricted unless coal is taken into the districts quickly, as stocks at some of the most important mines and smelters are quite low.

Operating costs at the mines show a rising tendency as the result of advancing prices for materials and supplies. Shortage of experienced mining labor tends toward higher wage scale.

Foreigners do not take kindly to the Copper Export Association's method of doing its own merchandising abroad. The London traders would like a monopoly of this business. But the Export Association has established its own branches and proposes to do business with foreign consumers direct.

Copper mines of this country are today producing 60 per cent of the world's supply, while our refineries are producing 80 per cent, so that it is little wonder that the American producing industry is determined to control the merchandising of its product.

NEW YORK METAL MARKET PRICES

Copper	July 27, 1922	Aug. 2, 1922
London, standard spot	£ s. d. 63 2 6	£ s. d. 63 2 6
	Cents per Pound	Cents per Pound
Prime Lake	14.00	14.00–14.25
Electrolytic	13.87½	14.00
Casting	13.35	13.45
Lead, Am. S. & R. price	5.75	5.75
Antimony	5.25	5.25
Nickel, ingot	36.00	36.00
Zinc, spot	6.25	6.60
Tin, Straits	32.25	32.25
Aluminum, 98 to 99 per cent	19.10	19.10
OLD METALS		
Heavy copper and wire	10.50–11.00	10.50–11.00
Brass, heavy	5.50– 6.00	5.75– 6.12½
Brass, light	5.00– 5.12	5.25– 5.37½
Lead, heavy	4.62½–4.65½	4.62½–4.75
Zinc, old scrap	2.87½–3.00	2.87½–3.12½

The Week in Trade

Prices When Quoted Are Those Reported at the Opening of Business on Monday of This Week for Points West of the Mississippi River and on Tuesday for All Eastern Points

DEMAND for electrical material in all parts of the country continues fair, manufacturers and jobbers reporting good stocks for most lines. In New England dealers report that radio apparatus is creating greater interest after the serious lull of the summer months. Second-hand dealers are not bothering motor dealers as previously and stocks are good. Central stations are placing many miles of new line in order to take care of the recent heavy construction of homes. Greater demand for lamps is noted. Better grades of fixtures are moving well.

New York

Conduit Sales Continue Brisk—Rubber-Covered Wire Demand Fair—Appliances Selling Well

Sales of electrical materials are more active this week than for the week before, jobbers in this section report. During the earlier part of the week fan sales were numerous, but their number fell during the few days of rain and colder weather. Rigid-conduit demand remains brisk despite the increase in price of July 24. Appliance demand remains steady and better than a year ago. Industrial business is good.

Conduit.—Demand continues brisk and stocks of smaller sizes are low.

Rubber-Covered Wire.—Prices are steady and demand is fair.

Lighting fixtures.—The better quality fixtures are in greater demand than last month.

Appliances.—Washers and cleaners are selling better than for many months past.

Chicago

Brisk Market for High-Tension Equipment—Motor Sales Active—Conduit Advances

Electrical trade for July maintained a fairly high level regardless of the usual summer tendency for a trade slump. Although this business curve from individual dealers contained peaks and valleys, the summation of all the trade curves would vary but little. The motor business is continuing its steady rate started during the spring.

High-tension manufacturers are unanimous in reporting a brisk business. The call for wiring materials continues. Manufacturers' card No. 52 came out July 24 increasing the price of conduit about 6 per cent. Safety switches are selling well since most of the new installations require this type of service switch.

Wire.—Current demand for rubber-covered No. 14 wire has varied but slightly since this material is required in the building industry. Prices still range around $6.25 per 1,000 ft. in 5,000-ft. lots. Stocks are good. The call for bare or weatherproof wire is unaltered, and prices vary from 16¾ to 17 cents per pound.

Conduit.—Jobbers reports indicate that stocks on the ½-in. conduit are still low. Shipments from manufacturers have not improved, owing to the various strikes. Card No. 52 went into effect July 24, thereby making the ½-in. black sell around $47 per 1,000 ft. in 5,000-ft. lots. Stocks of the larger sizes are in better condition. Demand is still active.

Flexible Armored Conductor.—This material is moving steadily at $43 per 1,000 ft. for the No. 14 two-wire, single-strip conductor. Stocks are ample.

High-Tension Equipment.—Sales by one manufacturer have been made for three 44,000-volt, 900-kva. steel-tower substations for the Northwest, one 66,000-volt, 3,000-kva., substation and one 66,000-volt, 600-kva. substation, both for the East. Another firm filled an order for 6,600-volt disconnecting switches and indoor busbar supports for a utility in New England. Shipments of lighting arresters, cut-outs and high-tension fuses were made by one manufacturer to California.

Motors.—Reports from five manufacturers indicate that the July sales will be equal to those of June, an active month. In some instances the sales curve has risen. Most of these sales have been for motors averaging under 15 hp., although some motors ranging up to 100 hp. have been sold. These motors are well distributed in industrial plants for replacements and also for further power extensions. Stocks of dealers are in good condition and prices are steady.

Transformers.—The call for distribution transformers has been steady but with few pronounced changes. Prices are firm and shipments have been timely.

Safety Switches.—Demand for this switch is good. A few dealers report sales on the large 600-amp. size for power installations. However, the standard 30-amp. switch is creating the greatest volume of trade.

Boston

Activity Reported in Radio—Loom Sales Better—Loom Purchases in Fair Quantities

Vigorous buying marked the beginning of the week after a rather spotty week end. Electrical manufacturers in Massachusetts and Connecticut are busier, and conditions are improving in most industries. Building contracts totaled $8,080,000 last week in New England, surpassing twenty years' record for the period. Deliveries are good on the whole, but some uncertainty exists in connection with steel products owing to labor troubles. Prices tend to harden in rigid conduit, flexible-armored conductor and pull sockets. Stocks are in excellent shape to meet increased demands. Dealer buying of radio equipment has taken a sharp upward spurt. Appliances are dull.

Radio Equipment.—Increased activity in purchasing is noted among dealers. Plans are being laid for a heavy fall business. Gaps in jobbers' stocks are being closed, and a huge wave of popular buying is expected in a few weeks.

Wire.—Rubber-covered wire moves at $6 to $6.25 per 1,000 ft. in 5,000 ft. lots. Sales are more active, owing to building booms. Better buying of waterproof is in sight. Bare is dull.

Rigid Conduit.—New quotations are out, marking advances in some fittings and stiffer pipe charges. One-half-in. galvanized, in less than 500 lb. lots, is quoted at $66.99 per 1,000 ft., and at $61.38 for black. Elbows in this size are practically unchanged from last week in either black or galvanized. Coupling are up, ½-in. galvanized being quoted at $6.37 and $5.79 according to quantity, and black couplings are $5.91 and $5.37 per 100.

Loom.—Northern New England continues to purchase this material in fair quantities. Dissatisfaction exists among jobbers and manufacturers as to current prices.

Flexible Armored Conductor.—Prices reflect sharp competition and deliveries showed some uneasiness Monday. Single strip No. 14, in 2,500-ft. lots, is quoted at $43.20 per 1,000 ft.

Motors.—Pick-up business dominates the market. Used motors no longer are causing manufacturers and distributors much anxiety. Production is far below the resources of present organizations, but better than a few months ago.

St. Louis

Impetus to Fan Sales Noted—Fuses Market Improving—Wire Demand Slackening

Except for fans and large power equipment, virtually all lines are showing decreased activity, attributed to hot weather and vacations. Industrial business is increasingly active, and considerable interest is being manifested in industrial heating equipment. Purchases by railroads are necessarily restricted except for motors and other equipment for use in roundhouses and shops where stationary engineers and firemen are on strike. Deliveries of material for stock are becoming more difficult.

The purchasing power of agricultural districts is substantially improved. Missouri's shipment of strawberries this year was four times that of 1921; corn and cotton show material improvement

since July 1, and receipts of live stock and prices for it are better than last year. The coal situation is hampering industries.

Conduit.—Prices have been raised the second time in about three weeks, the last increase being three points. Demand showed some decline this week.

Fans.—Continuous hot weather is giving a late-season impetus to sales, especially in the smaller sizes of oscillators. This demand is being used to decrease stocks, and if it continues there will be a small carry-over to next year.

Dry Cells.—Little variation is experienced from week to week in demand or supply, business being generally good. The regulator sells for $30.86 per 100 and the igniter for $31.86 per 100, both in barrel lots. The four-cell battery is quoted at $1.70 each in lots of 24.

Fuses.—Increased industrial activity is improving sales, which are about 10 per cent better than last month. Following are representative prices on 250-volt non-renewable, cartridge-type, in standard-package lots, per 100: 0-amp. to 30-amp., $4.60; 35-amp. to 60-amp., $6.90; 65-amp. to 100-amp., $20.70; 110-amp. to 200-amp., $46; 225-amp. to 400-amp., $82.80; 450-amp. to 600-amp., $126.50. Prices on renewable fuses, in lots of 100, are, per 100: 0-amp. to 30-amp., $29; 31-amp to 60-amp., $58; 61-amp. to 100-amp., $116; 101-amp to 200-amp., $232. In the same sizes fuse links are quoted at $1.74 per 100, $2.90 per 100, $5.80 per 100 and $8.70 per 100, respectively.

Wire.—Some slackening in demand for the week is found, permitting building up of slightly better stocks. Prices are unchanged, rubber-covered being sold at the following prices per 1,000 ft. in 1,000-ft. lots: No. 14, $6.25; No. 12, $9.75; No. 10, $12.50. The base on bare and weatherproof is quoted at 17 cents per pound.

Sewing Machines.—Demand for machines is extremely slow and that for motors is but little better. Stocks are low, but turn-over is very small.

Radio.—Greater satisfaction in receiving, due to the installation of a very powerful local broadcasting station, has increased interest, tending to offset the summer slump. Stocks are still low but materially better than in the spring.

Atlanta

Armored Conductor Movement Good—Brisk Demand for Conduit Continues—Lightning Arresters Slow

There has been no marked change in general conditions in the Southeast in the past week. All lines of trade are active and little anxiety is felt over the rail and coal strikes, though electrical jobbers anticipate an increase in the price of articles containing steel, because of the shortage of coke. Electrical jobbers report the outlook bright, with seasonal lines going excellently, lightning arresters excepted.

Farm-Lighting Outfits.—Jobbers report only a fair movement in this line at present, though many inquiries are received and orders are expected to materialize as soon as fall crops are harvested. Stocks and shipments are satisfactory.

Armored Conductor.—The movement in this line continues very good. Stocks, which a few weeks ago were low, have been brought up to normal, and no recent price changes are reported. Shipments are only fair.

Conduit.—A brisk demand for this item continues, despite a three-point advance in price. Stocks are very much improved over the condition several weeks ago, but shipments are not all that could be desired.

Meters.—The predicted midsummer increase in the activity of this line has not yet materialized, though it should shortly. Local stocks are reported only fair, but shipments are good.

"White Way" Lighting Equipment.—Interest in this line continues, quite a few sales being reported, and all jobbers are in receipt of an increasing number of inquiries. No recent price changes recorded and shipments are only fair.

Lightning Arresters.—The movement of this item this season has not come up to jobbers' expectations, and as a result good stocks are on hand throughout the section.

Salt Lake City—Denver

Record Fan Sales—Merchants Dissatisfied with Radio Market—Wiring Prices Are Lower

The peak of the hot-weather season is passed with indications of a good record in fan sales for 1922. The increase over the early months of the 1921 season is marked. Retail prices show a general reduction of about 20 per cent. The sizes most in demand are 12-in. and 16-in. Sales for commercial and home use stand about even.

Some merchants express dissatisfaction at the status of the radio market. They report many disappointed users and attribute the condition to the wide publicity that has been given to amateur construction. The market is unstable, the wide range of prices on sets resulting in a condition that borders on chaos.

Wiring materials for cottages are in much better demand. Cost of labor is slightly higher than a year ago, but prices are lower. Contracts are now being taken on a schedule that is 15 to 20 per cent lower than a year ago. The wire market itself is a little firmer.

Preparations for electrical demonstration schools are being promoted jointly by newspapers and merchants. Crop conditions are generally good in the Inter-mountain country. Damaging interruptions in fruit shipments are reported as being due to the railroad strike. Coal production is running far ahead of local demand, the surplus finding a good market East and West.

Portland—Seattle

Central Stations More Active in High-Tension Line Work—Prices Are Steady

Lumber production has reached normal again. New business is 8 per cent below production and shipments continue excellent.

Although grain and dairy production is somewhat reduced, it is felt that the situation of the public in general is better than a year ago. The coal strike has affected the mines in western Washington very little.

The employment situation is very materially improved, and skilled labor in many lines is difficult to obtain. Three major industries—lumber, agriculture and building—are making heavy demands upon labor at this time. The number of unemployed is far below what it was a year ago, in spite of the strike situation.

Electrical jobbers report business to be in good condition and better than a year ago. Demand for line construction material and building material is very active.

The warmer weather of the past week has had a quickening influence on fan sales, which had been experiencing a lull. Prices in all lines continue stable.

Central stations in the Northwest are more active in high-tension line construction work and power development this summer than for several years past.

Dry Cells.—No. 6, regular, are quoted at $35.50 per 100 in barrel lots of 125, and ignition cells at $36.50 per 100.

Tape.—Friction tape is quoted at $20.90 per 100 in ½-lb. rolls in quantities of fifty rolls, and rubber-covered at $19.30 per 100 rolls.

Fuses.—Edison plug fuses are quoted at $2.90 per 100 in lots of 500.

San Francisco

Many New Lighting Jobs Reported—Motor Stock in Good Shape—Cleaners Slow

Parks are being built in northern California which are a new and prolific source for lighting and power business. California leads in ratio of automobiles to population, averaging one machine to six people.

Street Lighting.—Many new jobs are reported in smaller interior cities. Jobs average about $20,000 of material.

Motors.—One factory making a "best-selling" home motor has recently put three field men in the northern California district to demonstrate the complete outfit. Local stocks are in good shape.

Radio.—Despite a sharp decrease in business, practically no repudiation of outstanding orders is reported.

Appliances.—Especial attention will be given merchandising at contractors' convention. There is a slight drop in the washer market. Vacuum cleaners are rather slow.

Activities of the Trade

Devoted to News of the
Manufacturer, Jobber, Agent, Contractor and Dealer, Including Important Orders and Contracts for Apparatus and Equipment

Hart & Hegeman to Enlarge Plant

The Hart & Hegeman Manufacturing Company, Hartford, Conn., will shortly let the contract for the construction of a reinforced-concrete factory building at its plant. It will be four-stories high, 180 ft. x 55 ft., and of firepoof construction throughout. Greenwood & Noerr, 847 Main Street, Hartford, are the architects and engineers.

Packard Electric Company Moves Its Chicago Office

The Packard Electric Company announces the removal of its Chicago office to 420 Wrigley Building and the addition to its sales force of Charles E. Drobnyk, who will assist Fred B. Duncan, manager of the Chicago district office. Mr. Drobnyk will interest himself in the sale of both transformers and automotive cable.

Torrington Company Transfers Cleaner Plant

The Torrington Company, Torrington, Conn., announces that it will in the future manufacture the company's make of vacuum cleaners at the "Standard" plant in Torrington. A six-story building will be used for that purpose. These cleaners were formerly manufactured in the Worcester (Mass.) plant of the company, which was closed early in July.

Charles H. Tenney & Company Move to Larger Quarters

Expansion of business has necessitated the relocation of Charles H. Tenney & Company, Boston, effective Aug. 1, at 200 Devonshire Street, where the organization will occupy quarters about 50 per cent larger than its former offices at 201 Devonshire Street. The entire ninth floor will be leased, and the financial, engineering and management branches of the organization will be more closely co-ordinated as a result of the change.

General Electric Company Business Improving

Business at the General Electric Company's plant continues to improve, and it is believed that by late fall the normal number of employees, about 18,000, will be on the payroll. About 15,000 employees are now working.

Radio apparatus is being manufactured on an extensive scale, and the plant has many orders to fill. Several small orders for regular electrical work have been received. A good share of the electrical work on contract recently closed by the General Electric Company for building and installing electrical equipment for the power station to be built at Crescent Dam, N. Y., will be done at the Schenectady plant.

New Quarters for Harry M. Hope Engineering Company

The Harry M. Hope Engineering Company has moved its offices from 185 Devonshire Street to 230 Boylston Street, Boston, occupying the entire seventh floor of the Bradbury Building. The new quarters of the company include about double the floor area of the former offices.

Crescentville Storage Battery Plant Receives Shipment

According to schedule the first shipment of metal for batteries in carload lots has arrived at the Crescentville plant of the Electric Storage Battery Company, Philadelphia. Two of the plate departments have started to get into shape to relieve the Allegheny Avenue factory, which is working at more than full capacity.

Habirshaw Cable Plants Shipped $820,000 Material in June

Thomas C. Perkins, chairman of the stockholders' protective committee of the Habirshaw Electric Cable Company, reports that the plants of this company at both Yonkers, N. Y., and Bridgeport, Conn., are now operating on full time. Shipments during the month of June amounted to $820,000, while incoming orders for the same month amounted to approximately $1,200,000. Total orders booked ahead amount to over $2,500,000. Figured on the basis of tonnage, the present business being done by the company is the largest in its history.

Cowan Truck Agencies Increased in Number

New agencies of the Cowan Truck Company, Holyoke, Mass., have recently been established at Philadelphia, Buffalo and Minneapolis. In the first-named city the Foster Manufacturing & Supply Company, Twentieth and Venango Streets, will represent the company in parts of Pennsylvania, Delaware and New Jersey. The Minneapolis Equipment Company, Builders' Exchange, Minneapolis, will cover the State of Minnesota, and Lewis P. Holladay, Jr., 411 Liberty Building, Buffalo, N. Y., will distribute this concern's products in western New York and Erie County, Pa.

General Railway Signal Company Receives Japanese Order

The Takata Exporting Company has placed an order with the General Railway Signal Company for 270 automatic signals to be used on the imperial government railways of Japan. The order covers equipment of the latest design and includes all auxiliary equipment, such as relays, transformers, etc., required for installation. Seventy long-range, three-indication, color-light signals are to be shipped to Kobe and 200 upper-left-hand quadrant, three-position semaphore signals are to be shipped to Yokohama.

This order, following as it does an order placed with the same company last year for 370 automatic signals, seems to indicate that substantial operating improvements are being made in the railways of Japan.

Johns-Pratt Sales Appointments Include Well-Known Men

Coincident with the establishment by the Johns-Pratt Company, Hartford, Conn., of its own sales organization, offices have been opened by the company at 41 East Forty-second Street, New York City; 35 South Desplaines Street, Chicago; 530 Call Building, San Francisco, and 161 Summer Street, Boston. Robert Charles Cole has been appointed sales manager of the electrical department, with headquarters at Hartford, Conn. George V. W. Ingham has been made Eastern sales manager and George W. Mapother, district sales manager, with offices in New York. Messrs. Fitts and Morse, of Fitts-Morse, Inc., will represent the company in New England, with the opening of the Boston office. George A. Saylor has been appointed Western sales manager with headquarters in Chicago, and A. T. Moan has been made Pacific Coast representative.

Western Electric Sales Show Fair Gain

Speaking of the improvement in sales for the first six months of 1922, C. G. Du Bois, president of the Western Electric Company, said:

"During the six months just ended our billings amounted to $99,500,000, or 7 per cent more than for the same months of last year. From past experience we estimate that total sales for 1922 will be only slightly less than the $206,000,000, the high-water mark of 1920.

"Notwithstanding this increasing business, the company was able to reduce its current bills payable by about $15,000,000 during the six months.

"Since April 1 over $6,000,000 of the 7 per cent bonds have been converted into 7 per cent preferred stock by the holders, and the company now has some 1,800 preferred stockholders, located in nearly every State of the Union. Of these stockholders about 800 are employees."

E. W. Ham Electric Company Buys New Home

The E. W. Ham Electric Company, Worcester, Mass., has purchased a concrete, brick and steel building with about 16,000 sq.ft. of floor area on Burnside Court, Worcester, and will soon move its offices and warehouse into the new location.

Seek to Restrain Radio Company By Court Order

A series of wireless patent suits and counter-suits have been started in the Supreme Court, New York, against the Wireless Specialty Apparatus Company, for an injunction restraining continuance of the publication of a series of "patent warning" advertisements which have recently appeared in the technical and trade press throughout the country.

The suit is being watched with considerable interest by wireless interests, including hundreds of radio apparatus manufacturers and radio dealers throughout the country, who will be guided by court decision as to their rights in regard to the alleged patent infringements contained in the "warning" advertisements.

The suit is being prosecuted by the Freed Eisemann Radio Corporation, 255 Fourth Avenue, supported by a group of radio apparatus manufacturers known as the "Independent Radio Manufacturers, Inc."

At the office of the attorneys for the plaintiffs it was learned that the basis of the suit is the alleged injury and damage to the reputations and business of these radio manufacturers through the "warning" advertisements inserted in the newspapers and magazines by the Wireless Specialty Apparatus Company.

These advertisements, it is stated, were addressed to radio dealers and listed twenty-one separate patents alleged to be the exclusive property of the dependents. Dealers were warned to insist upon receiving written guarantees from the manufacturers selling them the apparatus, which guarantees were to hold them free from all financial losses by way of damages in case of prosecution for infringements of patents listed.

C. Brandes, Inc., New York City, manufacturer of radio headsets, announces establishment of a Canadian factory at Ottawa.

The Manchester Electric Company, Manchester, Conn., has begun the erection of a transformer house on New Street, Manchester.

The Beard & Stone Electric Company, Inc., is a firm recently organized in Waco, Tex., which will deal in all kinds of electrical wares and merchandise. The company is capitalized at $30,000, and the incorporators are E. C. Beard, C. A. Stone and J. R. Davis.

The Metropolitan Manufacturing Company, 443 South Dearborn Street, Chicago, has been incorporated for general manufacturing of cooking and lighting and mechanical devices at a capitalization of $50,000 by Michael J. Breen, Damase H. Moran, Ludger D. Bergeron, William E. Dickson and Alphonse L. Caron.

The McClave-Brooks Company, manufacturer of McClave stokers, grates and steam blowers, announces that the Pittsburgh office, 1623 Oliver Building, will be in charge of A. F. Duemler, former assistant manager of the Philadelphia office. George Blair, Jr., who has been temporarily in charge of both offices, will continue in charge of the Philadelphia branch. The company also announces that it has appointed Joseph B. Nores, 834 Connel Building, Scranton, Pa., to represent it in the anthracite field in eastern Pennsylvania.

Westinghouse Sales Managers Hold Annual Meeting

In accordance with the custom of the company, the annual meeting of the sales managers of the Westinghouse Electric & Manufacturing Company was held recently at Lakewood, N. J.

The sales managers, including the managers of all departments of the company and managers of the various district offices, are the powers behind the large sales organization of the Westinghouse company and their decisions have much to do with the sales policies.

Many important actions were taken by the sales managers at their five-day meeting recently, which was presided over by H. D. Shute, vice-president of the company in charge of sales.

The accompanying photograph shows the managers just after the close of a business session.

Front row, left to right—J. A. Brett, manager, Cincinnati; H. F. Baetz, treasurer; H. D. Shute, vice-president in charge of sales; W. H. Whiteside, sales representative on the Pacific Coast; J. C. McQuiston, manager of the department of publicity.

Second row—G. H. Cox, manager, Boston; A. A. Brown, manager of syndicate operations; D. D. Faris, assistant manager of marine department; N. G. Symonds, manager, Chicago; W. K. Dunlap, vice-president.

Third row—C. C. Owens, manager, Detroit; H. A. Coles, manager, Atlanta; H. M. Southgate, manager, Washington; J. McA. Duncan, manager, Pittsburgh.

Fourth row—E. H. Sniffin, manager of power department; J. M. Curtin, manager of industrial department; J. J. Gibson, assistant to vice-president.

Fifth row—W. D. McDonald, manager, Seattle; Charles Robbins, assistant to vice-president; G. B. Griffin, manager of automotive equipment department; F. A. Estep, president of R. D. Nuttall Company.

Sixth row—T. J. Pace, manager of supply department; C. E. Heise, manager, San Francisco; H. M. Bostwick, manager of sales for Canadian Westinghouse Company; H. H. Seabrook, manager, Philadelphia; R. S. Feicht, director of engineering.

Seventh row—K. E. Van Kuran, manager, Los Angeles; W. S. Rugg, assistant to vice-president.

Top row—C. W. Underwood, manager, Buffalo; C. E. Allen, manager, St. Louis; R. B. Mildon, assistant to vice-president; J. F. Johnson, large-turbine engineer; L. M. Cargo, manager, Denver; J. S. Tritle, manager of merchandising department; M. B. Lambert, manager of railway department; A. E. Allen, manager, New York.

Foreign Trade Notes

EXTENSIONS AND IMPROVEMNTS CONTEMPLATED TO THE MANILA ELECTRIC RAILWAY. — Authority has been granted the Manila (Philippine Islands) Electric Railway, according to *Commerce Reports*, to issue 20,000,000 pesos of bonds for financing improvements and extensions.

PROPOSED TELEPHONE EXTENSIONS IN FRANCE.—Under the general plan for the reorganization of the French communication system, *Commerce Reports* states, extensive improvements are contemplated to the telephone system. The draft of the proposed legislation provides for an appropriation of 1,675,000,000 francs for its reconstruction and extension. This will include the construction of 400,000 km. of telephone toll cables, designed to provide for traffic growth for years to come and to facilitate long-distance telephone service to every part of France. New automatic exchanges will be erected to replace all the older exchanges in the large cities. Automatic exchanges will be installed generally through the rural districts, and tie lines will be provided to furnish the rural exchanges with long-distance services.

A NEW POWER PROJECT AT TSING-TAU, CHINA. — The Tsing-tao Electric Power Company, according to *Commerce Reports*, has been formed with a capital stock of 12,000,000 yen, to erect a new plant at Shufang for the purpose of furnishing power to industrial enterprises to be located on reclaimed land near the "Great Harbor" at Tsing-tao and to factories at Litsun, Shufang and Tsankou. The power station is to have a capacity of 6,000 kw. with a standby plant of 3,000 kw. The enterprise, which is to be Sino-Japanese, is said to have no connection with the municipal electric light plant to be turned over to China with the Kiaochow territory.

PROPOSED EXTENSION OF ELECTRIC SERVICE TO RURAL DISTRICTS IN THE LOIRE INFERIEURE, FRANCE. —At the spring meeting of the Conseil Général (governing body) of the Department of the Loire Inférieure, *Commerce Reports* states, the question of electrifying 167 cantons of the department not already supplied with electricity by private companies was again discussed and voted upon favorably for the second time. The plan includes a high-tension main line carrying 30,000 volts, paralleled by a second main line carrying 15,000 volts. The main line, 87 miles long, together with six transforming centers for secondary distribution, is estimated at 11,365,000 francs. The cost of the secondary distribution is estimated at about 3,000,000 francs, and the annual cost to the department for interest and operation is placed at about 1,778,000 francs. The annual consumption of electricity in the territory to be supplied is estimated at about 5,400,000 kilowatt-hours. The source of electric power has not been decided, but the water-power concession of the Paris-Orléans Railroad Company in Haute Dordogne, northeast of Bordeaux, has been mentioned. The main lines in the Department of the Loire Inférieure are to remain the property of the government, but the questions of secondary distribution and operation have not been decided. A Paris company, specialist in high-tension electric construction, it is stated, have made an advantageous offer for erecting the main lines.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

A mercantile firm in Italy (No. 3,004) desires to purchase and secure an agency for the sale of metal-working machines, files and twist drills, electric generators, machinery, mechanical appliances, etc.

An engineering firm in India (No. 3,015) desires to secure an agency for the sale of electrical goods, general hardware, galvanized and copper wire, etc.

TELEPHONE APPARATUS FOR BRISBANE, AUSTRALIA.—Tenders will be received at the Postmaster-General's Department, Brisbane, Australia, until Sept. 27 for furnishing telephone apparatus as per Schedule 561, including bells, condensers, induction coils, generators, extension switches, tumbler switches, telephone transformers, etc.; also until Sept. 20 for furnishing switchboard apparatus as per Schedule 559, including "calcugraphs," timing clocks, generators, indicators, lamps, telephone sets, receivers for sets, etc.

ELECTRICAL EQUIPMENT FOR HOBART, TASMANIA.—The City Council of Hobart, Tasmania, will receive tenders until Oct. 2 for a 750-kw. rotary converter and transformer and a 550-volt direct-current switchboard panel for same.

AUTOMATIC SWITCHBOARDS FOR VICTORIA, AUSTRALIA.—Tenders will be received by the Postmaster-General's Department, Melbourne, Australia, for automatic telephone switchboards for the Ascot (Victoria) exchange as per Schedule 39, and for the North Melbourne exchange as per Schedule 40.

New Apparatus and Publications

CIRCUIT BREAKERS. — The Cutter Company, Philadelphia, has issued a ninety-eight-page booklet which describes and illustrates its "I-T-E" and "U-Re-Lite" circuit breakers.

WIRELESS INSTRUCTION.—"Construction of Radio Receiving Sets" is the title of a textbook published by the Bruce Publishing Company, Milwaukee. L. Day Perry and R. O. Buck are the authors.

BUSBARS AND CONDUCTOR FITTINGS.—The Delta-Star Electric Company, 2433-2459 Fulton Street, Chicago, is distributing bulletin 38, describing its busbars and conductor fittings. This bulletin also includes an index covering the entire line of products of the company.

GENERATING UNITS. — Bulletin No. 1,122, entitled "Steam Turbines and Alternator Units," issued by the Allis-Chalmers Manufacturing Company, Milwaukee, describes its steam-turbine and generator units, non-condensing and condensing type for sugar mills, refineries, sawmills, power and manufacturing plants, etc.

RADIO SUPPLIES. — Julius Andrae & Sons Company, Broadway and Michigan Street, is distributing catalog supplement R-2-A, covering various types of receiving equipment for radio telephone and telegraph.

RADIO INSTRUMENTS. — The Jewell Electrical Instrument Company, Chicago, is distributing an eight-page leaflet covering its complete line of radio instruments.

SUCTION SWEEPER.—The Hoover Suction Sweeper Company, North Canton, Ohio, is distributing a six-page folder covering its model 961 new improved heavy-duty "Hoover" electric suction sweeper.

METERS. — Bulletin 622 issued by the Esterline-Angus Company, Indianapolis, Ind., describes its new "Utility" voltmeter for both alternating current and direct current service. Four other graphic meters are also covered in this bulletin, including electrolysis meters, speed recorder, pressure and time recorders.

WINDOW LIGHTING. — The Display Stage Lighting Company, Inc., 314 West Forty-fourth Street, New York City, is distributing a poster covering its "Baby Hercules" border light for window lighting.

METAL-COATING PROCESS.—The Metals Coating Company of America, 495 North Third Street, Philadelphia, has issued an eighteen-page pamphlet, entitled "Schoop Metal Spraying Process," describing the "Schoop" metal-coating process.

BALL BEARINGS.—"Ball Bearings for Electrical Machinery" is the title of a sixty-eight-page pamphlet published by the SKF Industries, Inc., 165 Broadway, New York City, in which it calls attention to the advantages of the use of ball bearings in electrical machinery.

New Incorporations

THE ELM CREEK POWER & LIGHT COMPANY, LTD., Elm Creek, Manitoba, Canada, has been incorporated with a capital stock of $20,000. Harry O. Fowler is director.

THE MIDDLE WISCONSIN POWER COMPANY, Madison, Wis., has been incorporated by C. W. Kernston, William J. P. Aberg and J. B. Sanborn. The company is capitalized at $25,000 and proposes to construct and operate electric light and power plants and other public utilities.

THE CLEVELAND (OKLA.) ELECTRIC COMPANY has been incorporated with a capital stock of $100,000. The incorporators are Alexander A. Boyd, Robert E. Garrettson, Michigan City, Ind., and J. B. Myers, Cleveland, Okla.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

AUGUSTA, ME. — The Central Maine Power Company is planning to issue $289,850 in capital stock, the proceeds to be used for additions and improvements.

SALMON FALLS, N. H.—Plans are being prepared by the Salmon Falls Manufacturing Company for the construction of a hydro-electric plant. Charles T. Main, 200 Devonshire Street, Boston, is engineer.

BRISTOL, CONN.—Preparations are being made for the installation of a new ornamental lighting system on Memorial Boulevard.

WINSTED, CONN.—The Winsted Gas Company has awarded contract to L. B. Dow & Son, Ayer, Mass., for equipment for a hydro-electric power plant to be erected at Robertsville Falls, including two 300-hp. waterwheels, with generators and other electrical equipment. The new station will replace a power house which is obsolete.

Middle Atlantic States

AMSTERDAM, N. Y. — The Adirondack Power & Light Corporation is planning to increase its capital from $23,100,000 to $25,000,000, part of the proceeds to be used for extensions and improvements.

BATAVIA, N. Y.—The Gennesee Light & Power Company has increased its capital from $350,000 to $500,000 for expansion purposes.

BROADALBIN, N. Y.—The Broadalbin Light & Power Company is planning to reconstruct the buildings at its plant, recently destroyed by fire. The loss is estimated at about $25,000.

BROOKLYN, N. Y.—The present fire-alarm system in the Greenpoint section is to be replaced with a modern system with underground wires. The installation of red lamps at every fire-alarm box in the borough has been recommended.

GLOVERSVILLE, N. Y.—Arrangements are being made by the Fonda, Johnston & Gloversville Railroad Company, for an issue of $550,000 in bonds, part of the proceeds to be used for extensions and improvements to its power plant and system.

NEWPORT, N. Y.—The Newport Electric Light & Power Company has applied to the Public Service Commission for permission to purchase water-power rights and certain other property of Prentiss & Wooster on West Canada Creek, about 2 miles from Newport.

NORWICH, N. Y.—Work has been started on the erection of a 45,000-volt transmission line from Norwich to Sidney and to Oneonta, a distance of 52 miles.

PERU, N. Y.—The town of Peru has granted the Plattsburg (N. Y.) Gas & Electric Company a franchise to supply electricity here. The cost of erecting the transmission line (8 miles) is estimated at $8,000.

PERU, N. Y.—The Adirondack Power & Light Corporation, Amsterdam, has been granted a franchise to extend the transmission lines of the Northern Adirondack Power Company, Keeseville, to Peru Township and furnish electrical service here.

BLOOMFIELD, N. J.—The Standard Oil Company of New Jersey, 31 Clinton Street, Newark, contemplates building a new distributing plant, with an electric station, in the Silver Lake section, to cost about $40,000.

MORRISTOWN, N. J. — The Morris & Somerset Electric Company will issue $200,000 in bonds, part of the proceeds to be used for extensions and improvements.

NEWARK, N. J.—The Balbach Smelting & Refining Company, 580 Market Street, plans to rebuild the portion of its power plant recently destroyed by fire, causing a loss of about $20,000.

NEWARK, N. J.—The Department of Parks and Public Property has been directed by the City Commission to arrange for the erection of a power plant at the municipal market, now in course of construction, to cost about $54,000.

PHILLIPSBURG, N. J.—The installation of an ornamental lighting system is under consideration by the Department of Public Works. The plans call for ninety-six standards.

CORAOPOLIS, PA.—Steps have been taken to organize a company under the name of the Coraopolis Electric Company to construct and operate a local electric plant.

ELLWOOD CITY, PA. — The Harmony Electric Company is extending its transmission lines to furnish electricity to the residents of Wylie Hill and vicinity.

HARRISBURG, PA. — The Harrisburg Light & Power Company has issued $44,000 in bonds for extensions, etc.

LOCK HAVEN, PA.—The Lock Haven Electric Light & Power Company has issued $200,000 in bonds, the proceeds to be used for the erection of a new power plant at Castanea.

MOUNTAINTOP, PA.—The Pennsylvania Power & Light Company, Allentown, has agreed to extend its transmission line to Mountaintop if sufficient number of patrons are secured.

OIL CITY, PA.—The Citizens' Light & Power Company contemplates an issue of $95,000 in capital stock, part of the proceeds to be used for extensions and improvements.

PITTSBURGH, PA. — The Duquesne Light Company is organizing the Bellevue Light Company as a subsidiary to take over and operate the properties of the Southern Heat, Light & Power Company in the North Boroughs district.

PITTSBURGH, PA.—E. P. Griffiths and J. R. McNary, 435 Sixth Avenue, and associates are organizing the Kennedy Township Light Company and the Neville Township Light Company to construct and operate systems in the respective townships.

STATE COLLEGE, PA. — The Public Service Commission has given its approval of the sale of the property of the State Center Electric Company to the Keystone Power Corporation, Ridgway.

VANDERGRIFT, PA.—The West Penn Power Company, Pittsburgh, contemplates rebuilding its local substation recently destroyed by fire, causing a loss of about $22,000.

CHARLESTON, W. VA.—Tentative plans have been prepared by the Virginia Electric Company, successor to the Virginia Electric & Machine Works, for extensions and improvements to its system. The company recently increased its capital stock to $300,000.

CHARLOTTESVILLE, VA.—The erection of a power plant at the Geer Industrial School is under consideration.

CHARLOTTESVILLE, VA.—The Charlottesville & Albemarle Railway Company is asking for bids for a 1,500-kw., 2,300-volt horizontal steam turbine with condenser and switchboard equipment. John L. Livers is president.

North Central States

IONIA, MICH.—The State Administrative Board has authorized the construction of a new power house at the Ionia Reformatory, to cost $60,000.

MOUNT PLEASANT, MICH.—A power plant will be erected at the new cement mill of the National Portland Cement Company, on Coldwater Lake, to cost about $500,000.

SAGINAW, MICH.—Bids will be received until Aug. 8 by the secretary of the board of education, Saginaw, for construction of a manual training school building, and also for the first unit of a detached power house on Webber Street. The cost is estimated at $250,000.

CLEVELAND, OHIO.—Bids will be received at the office of the commissioner of purchases and supplies, City Hall, until Aug. 11 for 17,716 feet of ten-conductor and 1,000 feet of two-conductor underground lead cable for the fire department. Bids will also be received at the same time and place for cross-arms.

DAYTON, OHIO.—A permit has been granted to the Dayton Power & Light Company for an extension to the Miller's Ford station, 85 ft. x 180 ft., five stories high, to cost about $300,000.

GALENA, OHIO.—The village officials are considering a proposal submitted by the Big Walnut Electric Company offering to extend its transmission line to Galena to furnish electrical service here.

LIMA, OHIO.—The plant and property of the Ohio Electric Railway Company will be offered at a public sale on Aug. 15 by J. B. Jones, receiver, including transmission system, interurban lines, etc. Bids of less than $2,000,000, it is stated, will not be accepted.

PIKESVILLE, KY.—The Sanitary Steam Laundry Company will install an engine-driven generator set and other electrical equipment at its plant.

GOSHEN, IND.—The Middle West Utilities Company has acquired the properties of the Hawks Electric Company, the Middlebury Electric Company and the Electric Transmission Company of Northern Indiana, all operating in this section, and the Winona Electric Light & Water Company, Warsaw, Ind. The properties will be merged and extensions and improvements made.

INDIANAPOLIS, IND. — The Central Indiana Power Company has issued $7,500,000 in bonds, the proceeds to be used to acquire the properties of the Merchants' Heat & Light Company, the Wabash Valley Electric Company, the Putnam Electric Company and the Cayuga Electric Company, and for extensions and improvements.

LAWRENCEBURG, IND.—The Board of County Commissioners contemplates building an electric light and power plant at the County Infirmary.

AURORA, ILL.—The Western United Gas & Electric Company has applied to the Public Service Commission for authority to issue $120,000 in notes and $15,000 in bonds, part of the proceeds to be used for extensions and improvements.

SPRINGFIELD, ILL.—The Illinois Power Company has petitioned the Public Service Commission for permission to erect a transmission line between Springfield and Pawnee for the interchange of power with the Central Illinois Public Service Company and also for approval of contract which has been entered into with that company.

WESTERN SPRINGS, ILL.—The Village Council has granted the Public Service Company of Northern Illinois, Chicago, a franchise to install a system and furnish electrical service here. The municipal plant, it is understood, will be abandoned.

ZION, ILL.—The assessment roll, which calls for $9,600, has been filed with the county clerk for the ornamental lighting system to be installed on the Sheridan Road through Zion.

ELKHART LAKE, WIS.—The property of the Badger Public Service Company has been purchased by the Albertson Engineering Company, Milwaukee.

FOUNTAIN CITY, WIS.—The Wisconsin Railway, Light & Power Company, La Crosse, has purchased the local electric light and power plant.

HAWKINS, WIS.—The Hawkins Light & Power Company contemplates the erection of a new plant.

OSHKOSH, WIS.—The Wisconsin Public Service Company has acquired the electric and gas plants of the Oshkosh Gas Light Company. Extensions and improvements, it is understood, will be made.

WAUKESHA, WIS. — The White Rock Mineral Springs Company contemplates an extension to its power plant, to cost including equipment, about $25,000. Henry C. Hengels, 445 Milwaukee Street, Milwaukee, is architect.

NODAWAY, IOWA.—At an election to be held Aug. 15 the proposal to issue $8,000 in bonds for the installation of a municipal electric light plant will be submitted to the voters. It is proposed to secure electricity from the Lee Electric Company, Clarinda.

SHENANDOAH, IOWA. — The electric companies operating at Red Oak, Villisca, Missouri Valley, Malvern and Shenandoah, controlled by the Continental Gas & Electric Company, Cleveland, have been consolidated and will be known as the Iowa Service Corporation. Improvements will be made to the system at Villisca, to cost about $10,000.

LAVALE, MO. — The Lavale Light & Power Company, recently organized by M. S. Berkeley and Ezra Deal to take over the power plant of the Lavale Milling Company, will build an addition to the station. New equipment including a turbo-generator, etc., will be installed and extensions made to the distributing system.

NEW FLORENCE, MO. — The Missouri Utilities Company, Mexico, contemplates extending its transmission line to New Florence and installing a distributing system.

ST. LOUIS, MO.—Bids will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., Aug. 15 for furnishing and installing an electric motor-driven turbine pump in local post office.

ST. LOUIS, MO.—Arrangements are being made to reorganize the Union Electric Light & Power Company and to issue $60,000,000 in capital stock, part of the proceeds to be used for extensions and improvements. Tentative plans are being considered for the erection of a large power plant in the East Side district.

ALVO, NEB.—Bids will be received by the Council until Aug. 9 for the construction of a transmission line and distributing system. The Hollister Engineering Company, Lincoln, is engineer.

ARKANSAS CITY, KAN.—Bids will be received by the City Clerk until Aug. 10 for two 1,500-gal. per-minute motor-driven centrifugal pumps and accessories. C. W. Lusk is city engineer.

COLONY, KAN.—Plans are being prepared for extensions and improvements to the municipal electric plant. Black & Veatch, Mutual Building, Kansas City, Mo., are engineers.

Southern States

ACME, N. C.—The Acme Manufacturing Company will install a new engine-driven generator set (about 250 capacity) and other electrical equipment at its power house.

CHARLOTTE, N. C. — Tentative plans have been prepared by the Southern Power Company for construction of a hydro-electric plant on the Cawtaba River, near Charlotte. It is proposed to build a dam between Van Wyck and Great Falls.

CHARLOTTE, N. C. — Negotiations are under way between the City Council and the Southern Public Utilities company for installing a new street-lighting system. It is proposed to replace the arc lamps now in use with modern lamps.

FAYETTEVILLE, N. C.—The Fayetteville Ice & Manufacturing Company is planning to rebuild the portion of its power house, recently destroyed by fire.

HOBGOOD, N. C.—Bids will be received by the Town Clerk, E. L. Bradley, until Aug. 15 for the construction of a transmission line and a local distributing system.

KINSTON, N. C.—Plans are under consideration for the erection of an administration building at the Caswell Training School, to cost about $400,000. Other buildings, to cost about $890,000, will ultimately be erected. C. B. McNairy is superintendent.

WILMINGTON, N. C. — The Tidewater Power Company contemplates erecting a transmission line from Wilmington to Warsaw (53 miles), and possibly from Warsaw to Clinton.

MACON, GA.—Proposals have been submitted to the City Council by T. J. Carstarphen and T. T. Carstarphen for the installation of an electric light plant.

SUMMERVILLE, GA.—The City Council has granted the Georgia Railway & Power Company, Atlanta, a franchise to supply electricity here. It is proposed to erect a transmission line from Lindale to Chickamauga. A substation will be erected near the city limits.

KNOXVILLE, TENN.—The installation of an ornamental lighting system on several of the streets in North Knoxville is under consideration by the North Knoxville Business Men's Association.

FAYETTEVILLE, ARK. — The Middle West Gas & Electric Company, New York City, is erecting a transmission line from Fayetteville to Rogers. When completed it is proposed to close down the plant at Rogers and furnish electricity at the latter place from the local plant.

CROWLEY, LA.—All arc lamps in the city will be replaced with improved type of street lamps.

EL RENO, OKLA.—The Oklahoma Gas & Electric Company will make extensions and improvements in the present street-lighting system. Plans for an ornamental lighting system have been temporarily abandoned.

LOCUST GROVE, OKLA.—Contract has been awarded by the town officials to the Electric Construction Company, Oklahoma City, for the erection of an electric transmission line to connect with the power plant at Pryor.

OKLAHOMA CITY OKLA.—The Oklahoma Gas & Electric Company has issued $500,000 in bonds, part of the proceeds to be used for extensions and improvements.

BELLEVUE, TEX.—L. A. Brantley, Dallas, Tex., and associates are planning to erect a light and power plant to furnish a local service.

BROWNFIELD, TEX. — An issue of $16,000 in bonds has been approved for the installation of an ornamental lighting system in the business section.

DALLAS, TEX.—The Council is consid-

ering extensions to the lighting system in the Oak Cliff section.

ELECTRA, TEX.—The Magnolia Petroleum Company will build a power house in connection with its new local repair shops, to cost about $250,000.

GALVESTON, TEX.—Work will begin at once on the one-story power house to be erected at the University of Texas. The Herbert M. Greene Company, Dallas, is architect.

McLEAN, TEX.—At an election held recently an issue of $74,000 municipal water, light and street improvement bonds were authorized.

VICTORIA, TEX.—The Southwestern Telephone & Telegraph Company will install an underground conduit system in the business district.

Pacific and Mountain States

DEER PARK, WASH.—Work will soon begin by the Mount Spokane Power Company on the erection of a three-wire, 12,000-volt transmission line from Deer Park to Clayton, a distance of about 5 miles. Electricity will be supplied to residences along the line as well as in Clayton. The cost is estimated at about $15,000. Improvements are being made at the power station on Little Spokane River, involving an expenditure of about $20,000.

EPHRATA, WASH.—Investigations are being made by the Washington Water Power Company relative to extending its transmission lines into the Rock Island district to supply electricity for irrigation purposes. The erection of 40 miles of new line from Ephrata would be required to furnish the service.

OLYMPIA, WASH.—The Council has awarded a contract to the Post Electric Company, Olympia, for the installation of an ornamental lighting system on certain streets.

SEATTLE, WASH.—The Puget Sound Power & Light Company has secured a franchise to construct new lines on Tenth and Thirty-fifth Avenues and other streets in the city.

THREE LAKES, WASH.—Arrangements, it is reported, are being made by the Three Lakes Lumber Company for rebuilding its sawmill and lumber plant, recently destroyed by fire, causing a loss of about $500,000.

HOLLYWOOD, CAL.—The Southern California Edison Company, Los Angeles, contemplates the erection of a new 33,000-volt transmission line between Hollywood and the San Fernando plant.

LOS ANGELES, CAL.—The City Council is considering the installation of electric lamps on Melrose Avenue and other streets in the St. Andrews and Marathon Street lighting district.

LOS ANGELES, CAL.—Extensions and improvements calling for an expenditure of about $6,000,000 within the next year have been announced by E. F. Scattergood, chief engineer of the bureau of power and light. The work will include seven new substations, to be located in Hollywood, Gardena, San Pedro and in the city proper, one near the Hall of Records, one in the Wilshire district, one at One Hundredth and Hoover Streets and one in the 900 block on Francisco Street, and also extensions to the municipal lighting lines.

MARE ISLAND, CAL.—Bids will be received by the Bureau of Yards and Docks, Navy Department, Washington, D. C., until Aug. 30 for circulating loop for central power plant at Mare Island. (Specification 4,684.)

NEWPORT BEACH, CAL.—The City Trustees have awarded a contract to A. C. Rice, 1963 Santee Street, Los Angeles, for the installation of an ornamental lighting system on Central Avenue, from E to Cypress Street, and on other streets.

SACRAMENTO, CAL.—Bids will be received by H. G. Denton, city clerk, City Hall, Sacramento, until Aug. 24 for construction of rapid sand filtration plant and appurtenances (Contract No. 24.) The equipment will include hydraulic and electrical controlling devices, conveyors, pulverizers, etc.

SANTA BARBARA, CAL.—The Southern California Edison Company will build a three-wire, steel-tower, 60,000-volt transmission line from Santa Barbara to the Ventura district, about 16 miles, to cost about $175,000.

SANTA MONICA, CAL.—An ornamental lighting system will be installed on Washington Boulevard and Marine Street.

SOUTH PASADENA, CAL.—The City Manager is negotiating with the Southern California Edison Company for the purchase of its local system, to be owned and operated by municipality.

VENICE, CAL.—The city engineer has been instructed to prepare plans for the installation of an ornamental lighting system on Washington Boulevard and Marine Street.

CULDESAC, IDAHO.—The Grangeville (Idaho) Electric Light & Power Company has submitted a proposal to the Commercial Club offering to furnish electricity in Culdesac.

REUBENS, IDAHO.—The installation of an electric lighting system in Reubens is under consideration. It is proposed to secure the service from the Grangeville (Idaho) Electric Light & Power Company.

CASA GRANDE, ARIZ.—The Casa Grande Valley Electrical District has entered into a contract with the Water Users Association of the Salt River Valley to furnish electricity from the Roosevelt power station in this district. The cost of the line is estimated at about $200,000. The State Legislature has appropriated $50,000 for securing electricity for the State Penitentiary at Florence, which will be included in the above project.

YUMA, ARIZ.—Bids will be received by the United States Reclamation Service, Denver, Col., until Sept. 6 for motors, transformers and switching apparatus for the valley drainage pumping plant, Yuma project, Ariz. A. P. Davis is director.

PUEBLO, COLO.—The Southern Colorado Power Company has issued $6,000,000 in bonds, part of the proceeds to be used for extensions and improvements.

TULAROSA, N. M.—Bonds to the amount of $75,000 have been voted for the installation of a municipal electric light plant and waterworks.

Canada

MUNCEY, ONT.—Surveys are being made for Caradoc Township for the erection of a transmission line between Delaware and Melbourne, a distance of 11 miles. The cost is estimated at $33,000. J. N. Wilson, engineer, 190 University Avenue, Toronto, will have charge of the project. J. Brodie is clerk.

WINDSOR, ONT.—Dodge Brothers, Inc., Detroit, Mich., manufacturer of automobiles, will build a power house in connection with its proposed branch plant here.

Electrical Patents

Announced by U. S. Patent Office

(Issued July 18, 1922)

1,422,815. SEPARATOR FOR STORAGE-BATTERY PLATES; G. E. Beck, Cleveland, Ohio. App. filed Dec. 17, 1920. Perforated non-conducting shell slips over every other plate.

1,422,826. ELECTRICALLY HEATED TONGS; F. O. Brown, St. Louis, Mo. App. filed Oct. 24, 1921.

1,422,837. CONNECTING TRANSMITTERS TO VACUUM-TUBE AMPLIFIERS; I. B. Crandall, Nahant, Mass. App. filed Oct. 13, 1917. Method of connecting a transmitter amplifier.

1,422,842. READING RIBBON IN SIGNALING MACHINES; Wilfrid Dougall, Montreal, Can. App. filed March 13, 1920. Signal from ribbon operated by magnets for touch reading.

1,422,877. ACOUSTICAL AID FOR DEAF PERSONS; J. P. Maxfield, Maplewood, N. J. App. filed Jan. 2, 1920. Binaural system with two radio amplifiers.

1,422,882. RADIO TRANSMISSION; H. W. Nichols, Maplewood, N. J. App. filed Sept. 1, 1915. Modulates waves in respect to wave form.

1,422,896. HEATING COIL FOR CARBURETORS; E. M. Soreny, Milwaukee, Wis. App. filed Jan. 7, 1918.

1,422,905. ELECTRIC COUPLING; C. H. Tomlinson, Mansfield, Ohio. App. filed June 22, 1912. For multiple-control circuits of electric cars.

1,422,910. TERMINAL BOX FOR ELECTRIC CABLES; C. R. Young, Bloomfield, N. J. App. filed Jan. 23, 1919. Type mounted on telephone poles.

1,422,920. MULTIPLE RECORDING INSTRUMENT; R. P. Brown and Fritz Wagner, Philadelphia, Pa. App. filed July 1, 1920. Instrument for separately recording a plurality of conditions.

1,422,931. DOOR-CONTROLLING DEVICE; H. W. Crane, Chicago Ill. App. filed Oct. 1, 1919. Door operated by motor.

1,422,992. ELECTRIC CONNECTOR; E. A. Kuen, Cincinnati, Ohio. App. filed May 24, 1920. Terminals for miniature light sockets.

1,423,039. ELECTRIC RADIATOR; C. F. Smith and G. E. Curtiss, New Britain, Conn. App. filed March 8, 1920. Convex heating unit.

1,423,045. ELECTRICAL CONNECTOR; E. Stranszky, Dover, Ohio. App. filed Aug. 20, 1918. Terminal for appliances such as flatirons, etc.

1,423,069. PROCESS FOR DISSOLVING OR RECOVERING METALS; Hans Bardt, Santiago, Chile. App. filed Sept. 17, 1921. Extracting copper by acids and then electrolyzing.

1,423,071. PROCESS FOR MANUFACTURING ELECTRODES; Hans Bardt, Santiago, Chile. App. filed Sept. 17, 1921. By electrolyzing carbonate of manganese and an excess of perchloric acid.

1,423,090. ELECTRIC MOTOR VEHICLE; J. K. Delano, New York, N. Y. App. filed July 21, 1920. Provides regenerative braking system.

1,423,107. ELECTRICAL GENERATING SYSTEM; H. A. Harrington, Cuyahoga Falls, Ohio. App. filed Jan. 10, 1920. Engine generator plant for isolated plants.

1,423,124. GASOLINE-ELECTRIC AUTOMOBILE; F. G. LeMerle, M. J. Ullman and J. E. Barry, Washington, D. C. App. filed Sept. 14, 1920. Governor adjustment maintains uniform speed regardless of grade.

1,423,141. MAGNETO-ELECTRIC MACHINE; C. Olivetti, Ivrea, Italy. App. filed June 19, 1919. For internal-combustion engines.

1,423,182. BRACKET FOR PRINTOMETERS; C. E. Brown, Chicago, Ill. App. filed Dec. 20, 1920.

1,423,309. ELECTRICAL CONDUIT SYSTEM; E. H. Curtis, Spring Valley, N. Y. App. filed July 6, 1918. Outlets adapted for setting in reinforced-concrete floor structures.

1,423,331. LIGHTING FIXTURE; K. Keller, Brooklyn, N. Y. App. filed Sept. 1, 1921. Portable lamp sockets on swivels.

1,423,345. SIGNALING METHOD AND APPARATUS; D. G. McCaa, Palo Alto, Cal. App. filed May 20, 1921. Radio receiving circuit.

1,423,380. ELECTRICALLY HEATED APPARATUS; R. F. Wherland, Stanley, N. D. App. filed Dec. 13, 1920. For heating battery compound.

1,423,497. ELECTRIC MECHANISM FOR SEARCHLIGHTS; L. C. Josephs, Jr. App. filed June 9, 1919. Portable mechanism carried in inclosed casing operated in front of mirror.

(Issued June 20, 1922)

1,420,055. SELECTIVE RECEIVING SYSTEM; H. W. Nichols, Maplewood, N. J. App. filed Dec. 18, 1920. Radio receiving arrangement employing multiple detection.

(Issued July 25, 1922)

1,423,518. FREQUENCY REGULATOR; L. Espenschied, Queens, N. Y. App. filed June 11, 1920. For any mechanism undergoing a periodic cycle.

1,423,575. TROLLEY ALIGNING HARP; S. S. Matthes, Mansfield, Ohio. App. filed Sept. 3, 1921. To maintain the collecting element in alignment with the axis of the pole.

1,423,582. MEANS FOR THE SUSPENSION OF ELECTRIC CONTACT WIRES; M. Semenza, Milan, Italy. App. filed July 21, 1921. Pair of elastic plates fulcrumed upon each other and held together under tension.

1,423,584. APPARATUS FOR ELECTROLYZING SOLUTIONS; K. E. Stuart, Niagara Falls, N. Y. App. filed Jan. 28, 1921. Discharge nozzle feeding salt in suspension to electrolytic cells.

1,423,601. DETECTOR FOR ALARM SYSTEMS; F. E. Crawford, Winchester, Mass. App. filed Aug. 12, 1918. Interruption of the door circuit will cause alarm.

1,423,622. SPARK-TESTING DEVICE FOR GASOLINE ENGINES; W. P. Mott, Chicago, Ill. App. filed March 29, 1919. Switch in spark plug circuit.

1,423,635. X-RAY CABINET AND MACHINE; W. H. Thwaites, Grand Rapids, Mich. App. filed Jan. 3, 1921. Turns horizontally and covers high-tension wires.

1,423,658. OZONE GENERATOR; H. B. Hartman, Scottdale, Pa. App. filed Jan. 24, 1920. Air-cooled, for water-purifying purposes.

1,423,672. MAGNETO IGNITION SYSTEM FOR INTERNAL-COMBUSTION ENGINES; J. L. Milton, Cleveland, Ohio. App. filed Feb. 18, 1913. Alters wave form to give effective timing range.